PARSONS ENGINEERING SCIENCE, INC.
A UNIT OF PARSONS INFRASTRUCTURE & TECHNOLOGY GROUP INC

19101 Villaview Road, Suite 301 • Cleveland, Ohio 44119 • (216) 486-9005 • Fax (216) 486-6119

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PARESCL/797/Dee/EJK7-7 **REVISED**

8 July 1997

Mr. Keith Houseknecht
CANTON DROP FORGE, INC.
4575 Southway Street
Canton, Ohio 44706

Reference: Canton Drop Forge, Inc. Lagoon #1 Re-Construction

Dear Mr. Houseknecht:

In accordance with our Scope of Work for the above-referenced project, Parsons Engineering Science, Inc. (Parsons ES) respectfully submits to Canton Drop Forge, Inc. (CDF) our Final Report. The enclosed report summarizes the results of environmental and geotechnical analyses completed, feasibility analyses of several alternative approaches considered for application of the biocell material and reconstruction of Lagoon #1, and the conceptual design, budgetary cost estimate and preliminary schedule for implementing the recommended option for addressing these issues.

We look forward to providing continued environmental and process engineering support to Canton Drop Forge in this and other matters under consideration. Please contact either Mr. Gordon Melle or me at (216) 486-9005 for questions or additional information regarding this effort.

Very truly yours,

PARSONS ENGINEERING SCIENCE, INC.

Ed Karkalik

Edward J. Karkalik, PE
Project Manager

EJK/dee
cc: File 73139701000

FINAL

CANTON DROP FORGE, INC.
LAGOON #1 RE-CONSTRUCTION
SUMMARY REPORT OF FEASIBILITY ANALYSES

Based on our Scope of Work for the entitled project, Parsons Engineering Science, Inc. (Parsons ES) respectfully submits to Canton Drop Forge, Inc. (CDF) this report. In the sections which follow, we summarize the results of the environmental and geotechnical analyses completed, the feasibility of several alternative approaches considered, and the conceptual design, budgetary cost estimate and preliminary schedule for implementing the recommended option for addressing the re-construction of Lagoon #1 and disposition of the biocell material.

SUMMARY OF CURRENT CONDITIONS

Sampling and Analysis Plan

Prior to sampling, a square grid pattern was lain over a copy of the map of the area which contained the material removed from Lagoon #1, i.e., the biocell (see Figure 1). The area of each grid section was 900 square feet (30 feet by 30 feet). A discrete number was given to each of the grid intersections (there are 77 intersection). A random number generator was then used to pick ten (10) grid intersection points which were then sampled in the field and submitted for analytical/environmental analysis. The samples were labeled CDF-1 through CDF-10. In addition, seven discrete sampling locations inside various grids were sampled and composited for geotechnical analysis. The sampling locations were labeled Geotech-1 through Geotech-7.

Samples which were obtained for analytical/environmental analyses were collected via hand at each selected sampling grid location. Samples were collected from approximately 0.5 feet below grade at each sample location. Sample material was placed directly into laboratory grade jars, sealed with screw-on Teflon-lined lids, place on ice in a cooler and transported to the laboratory. The samples were transported under chain-of-custody procedures to GeoAnalytical, Inc. laboratories in Twinsburg, Ohio for environmental and chemical analyses. Soil samples were analyzed following the Voluntary Action Program (VAP) protocol for total petroleum hydrocarbons, middle range organics (TPH-MRO, EPA method SW846-4015A (modified)), total petroleum hydrocarbons heavy range organics (TPH-HRO, EPA method SW846-4015A (modified)), TPH (EPA method 418.1), and semi-volatile organic compounds (SVOCs, EPA method SW846-8270B). Table 1 summarizes the analytical methods used for this effort.

The soil sample obtained for geotechnical analyses represented a composite of seven sampling locations (e.g., Geotech-1 through Geotech-7). Samples were collected from approximately 0.5 feet below grade at each sample location and placed in a 5-gallon bucket with a sealed lid. The sample material was transported to Applied Construction Technologies, Inc. (ACT) in Cleveland, Ohio for analysis and treatability testing. The composited sample material was mixed with varying amounts of lime and fly ash and subjected to the California Bearing Ratio test (ASTM D1883) to determine the resulting materials' relative bearing capacities. Four test runs were made, one each for the following soil, lime and fly ash mixtures:

- Biocell material with no lime and no fly ash;
- Biocell material with 2% lime and 10% fly ash;
- Biocell material with 6% lime and 22.5% fly ash; and
- Biocell material with 10% lime and 35% fly ash.

Results of Analyses

Table 2 presents the results of analytical and environmental testing for the soil samples collected for chemical analysis. Table 2 only summarizes compounds which were detected during analysis. The complete analytical reports received from GeoAnalytical, Inc. have been included as Appendix A. Please note that the "VAP Limits for Industrial Use Properties" displayed in Table 2 may only be used if the biocell material is deposited between two confining clay layers with vertical hydraulic conductivity of less than 10^{-5} cm/sec. If the biocell materials are enplaced in any other configuration, more conservative VAP limits will apply. It should also be noted that the oily nature of the sampled material caused matrix interference in the laboratory, producing elevated detection limits for SVOCs.

Results of geotechnical analyses and treatability testing are summarized in the table contained in Appendix B. These indicate that, for the soil, lime and fly ash mixtures tested, the second case (i.e., with 2% lime and 10% fly ash) produced the most desirable results. Please note that this mixture is not necessarily the ***optimal*** result; subsequent discussions with the laboratory have indicated that slightly lower additions of lime and fly ash may produce a mixture with an adequate bearing capacity.

Implications of Analytical Results

Implications of the environmental and chemical analytical results are such that the material contained in the biocell should be suitable for application following the guidance of the VAP regulations. There are no compounds, which are required to be analyzed under VAP, with values exceeding the limits provided in VAP's Generic Numerical Standards for industrial use properties [OAC 3745-300-08]. To apply these limits, CDF must agree to maintain this property in industrial use in perpetuity. Also, in the future, should CDF decide to obtain closure of this property (or the portion being addressed in this project), the entire VAP protocol must be completed, resulting in issuance of a No Further Action (NFA) Letter by a Certified Professional and, if desired, a Covenant Not To Sue (CNS) by Ohio EPA.

Implications of the geotechnical analytical and treatability testing results are that, in order to maintain structural integrity in future applications (see specifically options b, c, and f below), stabilization with lime and fly ash is required. Please note that the long-term effects of certain applications, i.e., specifically as wearing surfaces in track or roadway and parking applications, have not been tested and are difficult to predict. For example, CDF should be aware that exposure to traffic and the elements (e.g., sunlight, precipitation, etc.) may result in physical or chemical changes in the stabilized soil mixture, resulting in potentially undesirable effects.

RCRA characterization testing (previously completed by Hammontree & Associates, prior to removal of the biocell material from Lagoon #1) indicated that the material was non-hazardous. Hence, the options presented below are considered feasible without the need for pretreatment for environmental risk reduction (i.e., fixation to prevent leaching should not be required).

FEASIBILITY ANALYSES

FOIA Review for VAP Applicability

Based on information from Mr. Fred H (Rick) Zollinger, Jr., Esq. of CDF, the Freedom of Information Act (FOIA) searches conducted at Canton (Air Pollution Control Division), Twinsburg (Ohio EPA, Northeast Ohio District), Columbus (Ohio EPA, Central Office), Chicago (US EPA, Region V) and Washington, DC (USEPA Headquarters) produced no information that would prohibit use of a VAP approach for disposition of biocell material and/or re-construction of Lagoon #1. Consequently, based on

the results of the FOIA searches and the environmental sampling and analyses summarized above, it has been determined that application of the VAP regulatory framework should provide guidance, which is acceptable to the major stakeholders (i.e., Ohio EPA, CDF), for this project.

Further review of CDF's operating and regulatory history has indicated that, at one time or another (but not necessarily currently), other regulatory frameworks may have been applicable. For instance, the underground storage tanks (USTs) are operated under the jurisdiction of the Bureau of Underground Storage Tank Regulations (BUSTR) or State (of Ohio) Fire Marshal. At least one UST (from one of three areas on the CDF property) has since been removed. Also, the landfill, which was located in the vicinity of the biocell and has since been closed, could possibly have been regulated under the Resource Conservation and Recovery Act (RCRA). Additionally, the Ohio EPA's Master Sites List (MSL) had included the CDF property (EPA ID no. OHD004465142) until recently, as a "low priority" site since 1985, due to an "oily wastes" problem; currently, CDF is listed with no priority or "activity" status given. Subsequent discussions, on a non-disclosure and non-binding basis, with Ohio EPA's VAP staff, have concluded that, since the material in Lagoon #1 (and now the biocell) is neither a listed or characteristic waste, RCRA does not apply and VAP guidance is appropriate. Of course, Ohio EPA staff could give a more certain, binding review only after site-specific details had been provided. In any case, it appears reasonable to follow VAP guidance for the current project. It should be noted, however, that several additional steps, i.e., Phase I property assessment, NFA Letter, etc., are required before the Lagoon #1 and biocell areas of the CDF property can be considered "closed" under VAP guidance. In other words, completion of these actions will not result in a regulatory closure of this portion of the CDF property. These proposed actions have been developed in accordance with the requirements of VAP, should CDF choose to seek VAP closure in the future.

Alternative Approaches for Biocell Disposal

In view of the potentially appropriate alternatives for the disposal of material contained in the biocell and concurrent re-construction of Lagoon #1, Parsons ES has considered the following approaches:

a) transportation to and disposal of the biocell material in an appropriately licensed off-site landfill;

b) stabilization, as described above for structural integrity, and deposition in an on-site area, which will later be re-surfaced with asphalt for parking;

c) stabilization, as described above for structural integrity, and deposition in an on-site area, which will be used as a track or roadway around the inside perimeter of the property;

d) transportation and sale to Ashland's Refinery in Canton for use as a feed-stock;

e) transportation and sale to a local asphalt plant for use as a feed-stock; and

f) stabilization, as described above for structural integrity, and deposition in an appropriate manner (see following section) in Lagoon #1 as part of the back-fill required to reduce the pond's capacity to that required for storm water management.

It should be noted that, in re-constructing Lagoon #1 for alternatives a, b, c, d, and e above, additional volumes of clean fill material (beyond that which may be required for option f), will be required in lieu of the volume of biocell material which is being used or disposed elsewhere and of the clay used to provide a lining under the layer of biocell material (enplaced in option f). Also, in all cases, a small, incremental volume of oil-impacted soil and water in Lagoon #1 must be removed prior to initiating any re-construction activities. Parsons ES proposes that, subject to CDF approval and subsequent to recovery of any free oil, the additional oily soil and water be transferred to the biocell and Lagoon #2, respectively.

Finally, except for the nature of an internal layer of biocell material (as in option f), the emplacement sequence for re-construction of Lagoon #1 would be similar for all options listed above:

- clay layer;
- biocell material (option f only);
- clay layer (option f only);
- HDPE liner (optional, if required); and
- stabilization layer (optional, if required).

Please note that for options a through e, clean fill may be substituted for the lower clay layer indicated above.

Screening Criteria

As indicated in our Scope of Work, the following criteria were used to screen the alternatives listed previously: economic impact (i.e., overall costs); scheduling impact; technical feasibility (i.e., implementability); stakeholder (i.e., regulatory agency, customer, neighbor, stockholder) acceptability; and permitting requirements. Table 3 provides a summary of the screening criteria definitions (see footnotes). Additional details concerning the definitions of the screening criteria and their application are contained in Appendix C.

Results of Screening

After applying the screening criteria to the alternative approaches considered, Parsons ES identified a recommended option for further analysis. Table 3 provides the results of the alternatives screening exercise. The **recommended option**, as a result of the screening effort, is option f, the stabilization and transfer of biocell material for use in re-construction of Lagoon #1. This option is preferred because it is:

- cost-effective (minimizing costs of transporting soil in comparison to options a, d and e, which involve off-site shipment of biocell material and hauling of an equivalent volume of clean fill from off-site to the CDF property);
- time-efficient (reducing risks of scheduling impacts potentially caused by others, as in options a, d and e);
- technically feasible (e.g., and readily implementable, in comparison with options b, c, d and e, for which ease of implementation is either uncertain or perceived to be more difficult);
- acceptable to the primary stakeholders (e.g., the risk takers, including regulatory agencies and CDF, in comparison with options a, d and e for which future control cannot be assured); and
- low risk with respect to permitting (in comparison with options a, c and d, which may require "permits" for off-site transportation of the biocell material).

A conceptual description, cost estimate and preliminary schedule for this option are provided in the following section. Please note that, for the sake of comparison only, costing and scheduling information were developed and are provided for the off-site landfill disposal option. The off-site landfill disposal option is being used as the "base case" in this comparison with the preferred option.

Alternative Approaches for Lagoon #1 Drainage

Parsons ES considered six (6) alternatives for the re-alignment and reconstruction of drainage facilities into and from Lagoon #1. These are described, in detail, in three facsimiles from Parsons ES to CDF, dated 22 May 1997, 30 May 1997, and 4 June 1997, which are included in Appendix D. As an overview, these options included high- and low-volume gravity discharges for Lagoon #1 to Lagoon #2; high- and low-volume pressure mains between Lagoon #1 and #2; and a pressure main from Lagoon #1 either to the discharge side of the oil/water separator or to an existing gravity sewer within the CDF plant. After review of the several options considered above and discussions with CDF's management, a composite option, consisting of a low-volume pressure main from Lagoon #1 to an existing gravity sewer within the CDF plant (near Building A), was selected and has been included as the Recommended Option (see next Section). [**Note:** The difference between the high- and low-volume options is dependent on the length of time assumed for discharging Lagoon #1 after a 25-year storm: within 24 hours or during two to three days, respectively.]

RECOMMENDED OPTION

Conceptual Design

The conceptual design for the preferred option includes implementation of the following steps. Figure 2 provides a profile view of the resulting conceptual design. To implement this design, we recommend that CDF plan to:

- remove any residual oily soil which remains in Lagoon #1 and transfer it to the biocell;
- remove and dispose of existing pump stand from Lagoon #1;
- re-grade Lagoon #1, as necessary, to assure that the side-walls are stable;
- relocate 8-inch diameter storm sewer along west side of Upsetter Building for proper elevation;
- place and compact a 12-inch layer of clay, in two 6-inch lifts, to provide an impermeable lining in the Lagoon #1 excavation;
- in the biocell, add and mix 2% lime and 10% fly ash with the oily soil to stabilize it;
- transfer the stabilized mixture from the biocell to Lagoon #1;
- place and compact the stabilized biocell material in Lagoon #1;
- place and compact one additional 6-inch layer of clay to cap and seal the surface of Lagoon #1;
- install new pump, foundation, electrical and appurtenances for discharging from Lagoon #1; and
- install new pressure main from Lagoon #1 to gravity sewer.

Depending on the final size of Lagoon #1, excess stabilized biocell material may be available. Drainage and traffic considerations must be taken into account for the possible locations for on-site placement and compaction of this material. Appropriate consideration of these factors must prevent future erosion of this material from the property.

Budgetary Cost Estimate

Parsons ES has developed, working in conjunction with Beaver Excavating Company, a budgetary cost estimate (i.e., within +/- 16.5%) of $194,000 for the recommended option. This estimate is based on the assumptions that:

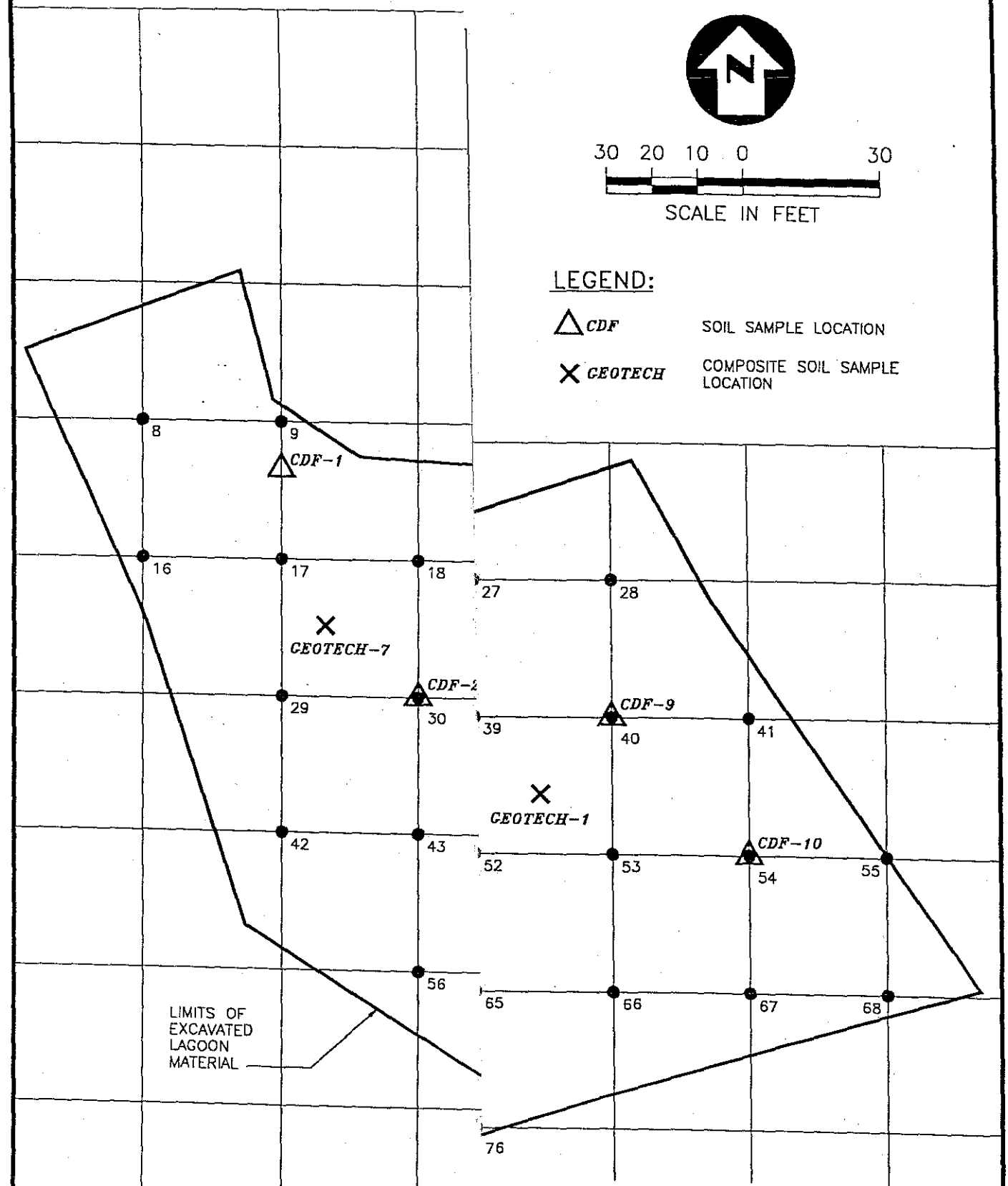
- about 3000 cubic yards of oily soil are available for stabilization in the biocell;
- about 600 cubic yards of additional oily soil may yet require removal from Lagoon #1 (and then stabilization at Lagoon #1);
- about 720 cubic yards of lime and flyash will be required to stabilize the biocell material; and
- about 600 cubic yards of clay will be required for the upper and lower layers lining the re-constructed Lagoon #1.

Table 4 contains the cost estimate, provided by major cost category. As an alternate, the base case of disposing of the biocell material in the American Landfill at Waynesburg (or alternatively at Central Waste in Alliance), with reconstruction of Lagoon #1 with virgin materials, is about $244,000.

Preliminary Schedule

It is projected that this recommended option, for re-constructing Lagoon #1 and addressing the disposition of the biocell material concurrently, can be accomplished within 9 to 10 weeks after CDF's issuance of an order to proceed. In particular, the final design for Lagoon #1 can be completed within 3-4 weeks. The construction phase of the project is anticipated to require about six (6) weeks.

FIGURE 1



SOIL SAMPLING LOCATIONS

CANTON DROP FORGE

4575 SOUTHWAY STREET
CANTON, OHIO

31397C01

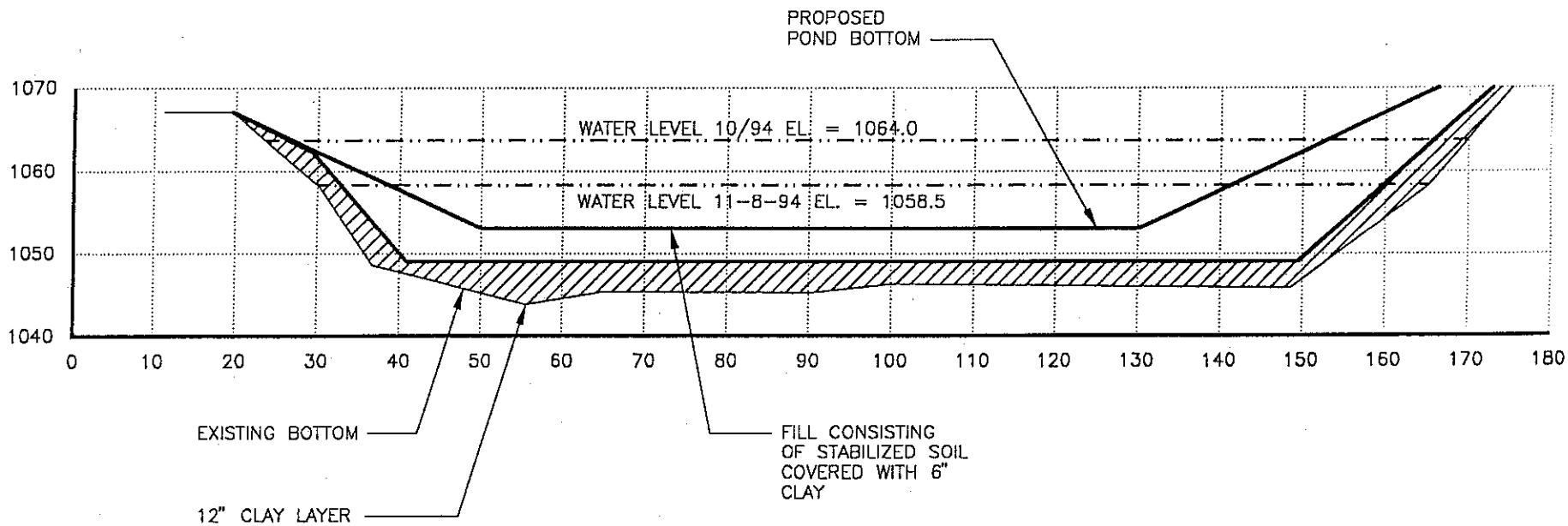
731397

CDF001505

731397.01000

PARSONS ENGINEERING SCIENCE, INC.

CDF001506



LAGOON CROSS SECTION

FIGURE 2

TABLE 1

ANALYTICAL PROCEDURES - SOIL
CANTON DROP FORGE
4575 SOUTHWAY STREET
CANTON, OHIO

18 April 1997

Analyte	Method
Total Petroleum Hydrocarbons - Middle Range Organics	EPA Method SW846-8015A (modified)
Total Petroleum Hydrocarbons - Heavy Range Organics	EPA Method SW846-8015A (modified)
Total Petroleum Hydrocarbons	EPA Method 418.1
Semi-Volatile Organic Compounds	EPA Method SW846-8270B

TABLE 2

RESULTS OF LABORATORY ANALYSIS - SOIL
CANTON DROP FORGE
4575 SOUTHWAY STREET
CANTON, OHIO

18 April 1997

Sample ID	Middle Range Organics (ppm)	Heavy Range Organics (ppm)	TPH-418.1 (ppm)	Pyrene (ppm)	Chrysene (ppm)
CDF-1	19.0	671	36,900	<20	<20
CDF-2	42.3	893	46,900	<20	<20
CDF-3	94.8	1,620	92,600	<20	<20
CDF-4	59.4	593	72,700	<20	<20
CDF-5	118	1,090	104,000	<20	<20
CDF-6	101	1,080	89,600	<20	<20
CDF-7	101	1,170	93,800	25.2	22.5
CDF-8	147	1,270	95,000	20.5	25.8
CDF-9	196	1,100	135,000	22.5	22.1
CDF-10	32.6	580	57,200	<20	<20
VAP Limits for Industrial Use Properties	20,000	40,000	NA	8,900	3,100

NA - Not applicable.

TABLE 3
CANTON DROP FORGE, INC. PLANT, CANTON, OHIO
LAGOON #1 RE-CONSTRUCTION OPTIONS

Indicator	Description of Lagoon #1 Re-Construction Options (in conjunction with disposition of biocell material)	Subjective Evaluation (1-5, with 5= best)					
		Economic Impact[1]	Scheduling Impact[2]	Technical Feasibility[3]	Stakeholder Acceptance[4]	Permitting Req'ments[5]	Overall Rating
A	Disposal in off-site landfill[6]	3	5	4	3	3	18
B	Stabilization in on-site parking area[6] (to be covered with asphalt)	2	4	4	3	4	17
C	Stabilization in on-site track or roadway area[6] (not covered)	2	4	3	2	5	16
D	Transport to Ashland's Canton Refinery for feed-stock[6]	2	2	1	3	3	11
E	Transport to asphalt plant for feed-stock[6]	2	2	3	3	3	13
F	Stabilization and use with clay layers in Lagoon #1	4	4	4	4	5	21

Notes:

1) Economic Impact = 1 for options $\geq$ \$60/tn and = 5 for options $\leq$ \$20/tn.
2) Scheduling Impact = 1 for options $\geq$ 8 months and = 5 for options $\leq$ 2 months.
3) Technical Feasibility = 1 for impractical / very difficult options and = 5 for easily implemented options.
4) Stakeholder Acceptance = 1 for options meeting substantial / insurmountable objections and = 5 for fully acceptable options.
5) Permitting Requirements = 1 for substantial / difficult requirements and = 5 for no permits required.
6) Options A-E include transport, placement and compaction of clean fill in Lagoon #1.

CDF001509

TABLE 4

BUDGETARY COST ESTIMATES (+/- 16.5%)
CANTON DROP FORGE, INC.
RECONSTRUCTION OF LAGOON #1

Task Description	Recommended Option Cost Estimate[1]	Off-Site Landfill Option Cost Estimate[2]
Conduct detailed design and construction review	$21,000	$13,000
Re-align 8" west-side storm sewer (200 ft)	$11,000	$11,000
Pump out Lagoon #1	$1,000	$1,000
Remove/dispose existing pump stand	$3,000	$3,000
Remove oily soil from Lagoon #1 (600 cy)	$12,000	$12,000
Re-grade Lagoon #1	$2,000	$2,000
Install new 6" pressure main from Lagoon #1 (500 ft)	$26,000	$26,000
Place and compact clay lining in Lagoon #1 (400 cy)	$14,000	$14,000
Stabilize oily soil material in the biocell (3,600 cy)	$36,000	--
Place and compact stabilized soil in Lagoon #1 (4,300 cy)	$43,000	--
Place and compact final clay layer (200 cy)	$7,000	$7,000
Install new pump, foundation, electrical and appurtenances	$9,000	$9,000
General conditions	$9,000	$5,000
Test, load, haul and dispose oily soil offsite (3,600 cy)	--	$117,000
Place and compact clean fill in Lagoon #1 (2,400 cy)	--	$ 24,000
TOTAL	**$194,000**	**$244,000**

Note: [1] Assumes that stabilized biocell material and clay liners, when compacted and placed, will provide sufficient capacity in Lagoon #1 for intended stormwater impoundment. Must be verified through survey (i.e., as part of general conditions).

[2] Assumes that biocell material can be disposed at American Landfill in Waynesburg without any pretreatment required (i.e., for stabilization, de-liquification, etc.).

APPENDIX A:

RESULTS OF ENVIRONMENTAL ANALYSES FROM GEOANALYTICAL, INC.

FOR

CANTON DROP FORGE, INC.
CANTON, OHIO

APRIL/MAY 1997

Parsons ES Cleveland, Ohio

LABORATORY REPORT TRACKING FORM

Project Name: Canton Drop Forge

Project Number: 731397.01000

Sample Date and Description: 4-18-97 / 10 soil

Project Manager: Ed Karkalik

Does report agree with COC? (YES) *NO Initials: DGG

Is Data Review Requested? YES (*NO) Initials: EK/DGG

REPORT SUBMITTED FOR DATA REVIEW:

Date Mailed: N/A Initials: ____

Date Received : ____ Initials: DGG

Date Completed: ____ Initials: ____

RECEIVED FAXED COPIES OF REVIEW:

Date: N/A Initials: DGG

TRACKING FORM COMPLETE ✓ Initials: DGG

*OTHER COMMENTS:

06-03-96 DGG

AFFIDAVIT

Certified Laboratory
CL0008

RECEIVED
MAY 19 1997
CLEVELAND ES

State of Ohio)
) SS:
County of Summit)

I, Thomas Morsefield, being first duly sworn according to law, deposes and states to the best of his/her knowledge, information, and belief, that:

1. Affiant is an adult over the age of eighteen (18) years old and competent to testify herein.

2. Affiant is employed by, and is authorized to submit this affidavit on behalf of GEOAnalytical, Inc.

3. The accompanying information, analytical reports, are being submitted relative to samples received with regard to property located at, and/or named Canton's Drop Forge, Proj. 731397.01000.

Samples were received by GEOAnalytical, Inc. ~~with~~ – without (strike one) an O.A.C. rule 3745-300-13 (L) affidavit from the volunteer or certified professional, Parsons Engineering Science.

4. The analytical reports are being submitted for the purpose of providing information about a site which affiant has reason to believe is being considered under the Voluntary Action Program.

CDF001513

5. The boxes checked below identify what information, documents, or reports are submitted:

a. (✓) Analytical Reports
b. (✓) Chain of Custody
c. (___) Sub-Contractors Report and Affidavit
d. (___) Other_____

6. Certain samples received by GEOAnalytical, Inc. may have required independent analysis and as such ~~were~~ were not (strike one) submitted to independent laboratory; NA

7. Said samples were submitted with affidavit pursuant to O.A.C. 3745-300-13 (L). (Not applicable if box 5c not marked.)

8. To the best knowledge, information, and belief of affiant, all information submitted is, true, accurate, and complete.

Further Affiant Sayeth Naught.

Thomas Morsefield

Sworn to before me this 15 day of May, 1997.

Judy A Catignani
Notary Public

JUDY A. CATIGNANI, Notary Public
STATE OF OHIO
Resident Summit County
My Commission Expires April 25, 2002

CDF001514

EXHIBIT A

GEO JOB NUMBERS:

9704102

9263 Ravenna Rd. • Suite A-7 • Twinsburg, Ohio 44087 • Phone 216 963 6990 • Fax 216 963 6975

GEO Analytical, Inc.

Report Issued To: Parsons Engineering Science
19101 Villaview Road, Suite 300
Cleveland, Ohio 44119

GEO Job# 9704102(A)
Matrix Type: Soil
Samples Received: 04/22/97
Date Analyzed: 04/25-26/97
Analysis Reported: 04/29/97

Project Number: 731397.01000
Project Name: Canton Drop Forge

NONHALOGENATED VOLATILE ORGANICS IN SOIL

Lab #	Date	Station Location	Middle Range Organics	Heavy Range Organics	Reporting Limit
1995	04/18/97	CDF-1	19.0	671	4.0
1996	04/18/97	CDF-2	42.3	893	4.0
1997	04/18/97	CDF-3	94.8	1,620	4.0
1998	04/18/97	CDF-4	59.4	593	4.0
1999	04/18/97	CDF-5	118	1,090	4.0
2000	04/18/97	CDF-6	101	1,080	4.0
2001	04/18/97	CDF-7	101	1,170	4.0
2002	04/18/97	CDF-8	147	1,270	4.0
2003	04/18/97	CDF-9	196	1,100	4.0
2004	04/18/97	CDF-10	32.6	580	4.0
			mg/Kg	mg/Kg	mg/Kg

Analytical Methodology Information

EPA Method SW846-8015A(Modified), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"

Middle Range Organics calculated from Heptane (C7) to Hexadecane (C16).

Heavy Range Organics calculated from Hexadecane (C16) to Dotriacontane (C32).

Samples may contain compounds with higher molecular weights than Dotriacontane (C32) which are not calculated in the Total Petroleum Hydrocarbons number reported.

These petroleum fractions are found in Rule 3746 of the OAC Section 3745-300-08 of the Generic Numeric Standards.

Initial Calibration Date: 05/20/96-01/09/97
Continuing Calibration Date: 04/25-26/97
Analyst: M. Darsot - C. Lang

ANALYSIS REVIEWED AND APPROVED BY Christie Traxler

CDF001516

9263 Ravenna Rd. • Suite A-7 • Twinsburg, Ohio 44087 • Phone 216 963 6990 • Fax 216 963 6975

GEO Analytical, Inc.

Report Issued To: Parsons Engineering Science
19101 Villaview Road, Suite 300
Cleveland, Ohio 44119

GEO Job#	9704102(B)	Project Number:	731397.01000
Matrix Type:	Soil		
Samples Received:	04/22/97	Project Name:	Canton Drop Forge
Date Analyzed:	04/25-28/97		
Analysis Reported:	04/29/97		

PETROLEUM HYDROCARBONS, TOTAL RECOVERABLE IN SOIL

Lab #	Date	Station Location	Result	Reporting Limit
1995	04/18/97	CDF-1	36,900	2,000
1996	04/18/97	CDF-2	46,900	4,000
1997	04/18/97	CDF-3	92,600	4,000
1998	04/18/97	CDF-4	72,700	2,000
1999	04/18/97	CDF-5	104,000	4,000
2000	04/18/97	CDF-6	89,600	4,000
2001	04/18/97	CDF-7	93,800	4,000
2002	04/18/97	CDF-8	95,000	4,000
2003	04/18/97	CDF-9	135,000	2,000
2004	04/18/97	CDF-10	57,200	2,000
			mg/Kg	mg/Kg

Analytical Methodology Information

EPA Method 418.1, "Methods for Chemical Analysis of Water and Wastes"

Initial Calibration Date: 04/25-28/97
Continuing Calibration Date: 04/25-28/97
Analyst: J. Woodall

ANALYSIS REVIEWED AND APPROVED BY Christy Thomm

CDF001517

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GEO Analytical, Inc.

Report Issued To: Parsons Engineering Science
19101 Villaview Road, Suite 300
Cleveland, Ohio 44119

GEO Job# 9704102(C)-1995
Matrix Type: Soil
Samples Received: 04/22/97
Date Analyzed: 04/30-05/02/97
Analysis Reported: 05/06/97

Project Number: 731397.01000
Project Name: Canton Drop Forge

Sample Date: 04/18/97
Sample Description: CDF-1

GAS CHROMATOGRAPHY/MASS SPECTROMETRY FOR SEMI-VOLATILE ORGANICS IN SOIL

COMPOUNDS	RESULTS	REPORTING LIMIT
N-Nitrosodimethylamine	< 100	100
Phenol	< 20.0	20.0
2-Chlorophenol	< 20.0	20.0
bis(2-Chloroethyl)ether	< 20.0	20.0
1,3-Dichlorobenzene	< 20.0	20.0
1,4-Dichlorobenzene	< 20.0	20.0
1,2-Dichlorobenzene	< 20.0	20.0
2-Methylphenol	< 20.0	20.0
bis(2-Chloroisopropyl)ether	< 20.0	20.0
4-Methylphenol	< 20.0	20.0
Hexachloroethane	< 20.0	20.0
N-Nitroso-di-n-propylamine	< 100	100
Nitrobenzene	< 20.0	20.0
Isophorone	< 20.0	20.0
2-Nitrophenol	< 20.0	20.0
2,4-Dimethylphenol	< 20.0	20.0
bis(2-Chloroethoxy)methane	< 20.0	20.0
2,4-Dichlorophenol	< 20.0	20.0
1,2,4-Trichlorobenzene	< 20.0	20.0
Naphthalene	< 20.0	20.0
4-Chloroanaline	< 20.0	20.0
Hexachlorobutadiene	< 20.0	20.0
4-Chloro-3-methylphenol	< 20.0	20.0
2-Methylnaphthalene	< 20.0	20.0
Hexachlorocyclopentadiene	< 20.0	20.0
2,4,5-Trichlorophenol	< 20.0	20.0
2,4,6-Trichlorophenol	< 20.0	20.0
2-Chloronaphthalene	< 20.0	20.0
2-Nitroanaline	< 20.0	20.0
Acenaphthylene	< 20.0	20.0
Dimethyl phthalate	< 20.0	20.0
2,6-Dinitrotoluene	< 20.0	20.0
3-Nitroanaline	< 20.0	20.0
Acenaphthene	< 20.0	20.0
2,4-Dinitrophenol	< 100	100
4-Nitrophenol	< 20.0	20.0
Dibenzofuran	< 20.0	20.0
2,4-Dinitrotoluene	< 20.0	20.0
	mg/Kg	mg/Kg

CDF001518

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GEO Job# 9704102(C)-1995
Page 2 of 2

COMPOUNDS	RESULTS	REPORTING LIMIT
Diethyl phthalate	< 20.0	20.0
Fluorene	< 20.0	20.0
4-Chlorophenylphenyl ether	< 20.0	20.0
4-Nitroanaline	< 20.0	20.0
2-Methyl-4,6-dinitrophenol	< 100	100
N-Nitrosodiphenylamine	< 20.0	20.0
4-Bromphenylphenyl ether	< 20.0	20.0
Hexachlorobenzene	< 20.0	20.0
Pentachlorophenol	< 20.0	20.0
Phenanthrene	< 20.0	20.0
Anthracene	< 20.0	20.0
Carbazole	< 20.0	20.0
Di-n-butyl phthalate	< 20.0	20.0
Fluoranthene	< 20.0	20.0
Pyrene	< 20.0	20.0
Butyl benzyl phthalate	< 20.0	20.0
Benzo(a)anthracene	< 20.0	20.0
3,3'-Dichlorobenzidine	< 100	100
Chrysene	< 20.0	20.0
bis(2-Ethylhexyl) phthalate	< 20.0	20.0
Di-n-octyl phthalate	< 20.0	20.0
Benzo(b)fluoranthene	< 20.0	20.0
Benzo(k)fluoranthene	< 20.0	20.0
Benzo(a)pyrene	< 20.0	20.0
Indeno(1,2,3-cd)pyrene	< 20.0	20.0
Dibenzo(a,h)anthracene	< 20.0	20.0
Benzo(ghi)perylene	< 20.0	20.0
	mg/Kg	mg/Kg

COMPOUND	% SURROGATE RECOVERY	ACCEPTABLE RANGE
2-Fluorophenol	91	33 - 144
Phenol d5	76	62 - 120
Nitrobenzene d5	100	80 - 132
2-Fluorobiphenyl	99	67 - 105
2,4,6-Tribromophenol	92	24 - 135
Terphenyl d14	82	49 - 141

* Indicates surrogate recovery outside of acceptable range.

Analytical Methodology Information

EPA Method SW846-8270B, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
Extraction Date: 4/25/97
Initial Calibration Date: 04/17/97-05/01/97
Continuing Calibration Date: 04/30-05/02/97
Analyst: T. Lang

REVIEWED AND APPROVED BY Christy Thomm

CDF001519

GEO Analytical, Inc.

Report Issued To: Parsons Engineering Science
19101 Villaview Road, Suite 300
Cleveland, Ohio 44119

GEO Job#: 9704102(D)-1996
Matrix Type: Soil
Samples Received: 04/22/97
Date Analyzed: 04/30-05/02/97
Analysis Reported: 05/06/97

Project Number: 731397.01000
Project Name: Canton Drop Forge

Sample Date: **04/18/97**
Sample Description: **CDF-2**

GAS CHROMATOGRAPHY/MASS SPECTROMETRY FOR SEMI-VOLATILE ORGANICS IN SOIL

COMPOUNDS	RESULTS	REPORTING LIMIT
N-Nitrosodimethylamine	< 100	100
Phenol	< 20.0	20.0
2-Chlorophenol	< 20.0	20.0
bis(2-Chloroethyl)ether	< 20.0	20.0
1,3-Dichlorobenzene	< 20.0	20.0
1,4-Dichlorobenzene	< 20.0	20.0
1,2-Dichlorobenzene	< 20.0	20.0
2-Methylphenol	< 20.0	20.0
bis(2-Chloroisopropyl)ether	< 20.0	20.0
4-Methylphenol	< 20.0	20.0
Hexachloroethane	< 20.0	20.0
N-Nitroso-di-n-propylamine	< 20.0	20.0
Nitrobenzene	< 100	100
Isophorone	< 20.0	20.0
2-Nitrophenol	< 20.0	20.0
2,4-Dimethylphenol	< 20.0	20.0
bis(2-Chloroethoxy)methane	< 20.0	20.0
2,4-Dichlorophenol	< 20.0	20.0
1,2,4-Trichlorobenzene	< 20.0	20.0
Naphthalene	< 20.0	20.0
4-Chloroanaline	< 20.0	20.0
Hexachlorobutadiene	< 20.0	20.0
4-Chloro-3-methylphenol	< 20.0	20.0
2-Methylnaphthalene	< 20.0	20.0
Hexachlorocyclopentadiene	< 20.0	20.0
2,4,5-Trichlorophenol	< 20.0	20.0
2,4,6-Trichlorophenol	< 20.0	20.0
2-Chloronaphthalene	< 20.0	20.0
2-Nitroanaline	< 20.0	20.0
Acenaphthylene	< 20.0	20.0
Dimethyl phthalate	< 20.0	20.0
2,6-Dinitrotoluene	< 20.0	20.0
3-Nitroanaline	< 20.0	20.0
Acenaphthene	< 20.0	20.0
2,4-Dinitrophenol	< 100	100
4-Nitrophenol	< 20.0	20.0
Dibenzofuran	< 20.0	20.0
2,4-Dinitrotoluene	< 20.0	20.0
	mg/Kg	mg/Kg

CDF001520

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GEO Job# 9704102(D)-1996
Page 2 of 2

COMPOUNDS	RESULTS	REPORTING LIMIT
Diethyl phthalate	< 20.0	20.0
Fluorene	< 20.0	20.0
4-Chlorophenylphenyl ether	< 20.0	20.0
4-Nitroanaline	< 20.0	20.0
2-Methyl-4,6-dinitrophenol	< 100	100
N-Nitrosodiphenylamine	< 20.0	20.0
4-Bromphenylphenyl ether	< 20.0	20.0
Hexachlorobenzene	< 20.0	20.0
Pentachlorophenol	< 20.0	20.0
Phenanthrene	< 20.0	20.0
Anthracene	< 20.0	20.0
Carbazole	< 20.0	20.0
Di-n-butyl phthalate	< 20.0	20.0
Fluoranthene	< 20.0	20.0
Pyrene	< 20.0	20.0
Butyl benzyl phthalate	< 20.0	20.0
Benzo(a)anthracene	< 20.0	20.0
3,3'-Dichlorobenzidine	< 100	100
Chrysene	< 20.0	20.0
bis(2-Ethylhexyl) phthalate	< 20.0	20.0
Di-n-octyl phthalate	< 20.0	20.0
Benzo(b)fluoranthene	< 20.0	20.0
Benzo(k)fluoranthene	< 20.0	20.0
Benzo(a)pyrene	< 20.0	20.0
Indeno(1,2,3-cd)pyrene	< 20.0	20.0
Dibenzo(a,h)anthracene	< 20.0	20.0
Benzo(ghi)perylene	< 20.0	20.0
	mg/Kg	mg/Kg

COMPOUND	% SURROGATE RECOVERY	ACCEPTABLE RANGE
2-Fluorophenol	92	33 - 144
Phenol d5	82	62 - 120
Nitrobenzene d5	102	80 - 132
2-Fluorobiphenyl	69	67 - 105
2,4,6-Tribromophenol	95	24 - 135
Terphenyl d14	94	49 - 141

* Indicates surrogate recovery outside of acceptable range.

Analytical Methodology Information

EPA Method SW846-8270B, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
Extraction Date: 4/28/97
Initial Calibration Date: 04/17/97-05/01/97
Continuing Calibration Date: 04/30-05/02/97
Analyst: T. Lang

REVIEWED AND APPROVED BY Christie Thaxton

CDF001521

Report Issued To: Parsons Engineering Science
19101 Villaview Road, Suite 300
Cleveland, Ohio 44119

GEO Job# 9704102(E)-1997
Matrix Type: Soil
Samples Received: 04/22/97
Date Analyzed: 04/30-05/02/97
Analysis Reported: 05/06/97

Project Number: 731397.01000
Project Name: Canton Drop Forge

Sample Date: 04/18/97
Sample Description: CDF-3

GAS CHROMATOGRAPHY/MASS SPECTROMETRY FOR SEMI-VOLATILE ORGANICS IN SOIL

COMPOUNDS	RESULTS	REPORTING LIMIT
N-Nitrosodimethylamine	< 100	100
Phenol	< 20.0	20.0
2-Chlorophenol	< 20.0	20.0
bis(2-Chloroethyl)ether	< 20.0	20.0
1,3-Dichlorobenzene	< 20.0	20.0
1,4-Dichlorobenzene	< 20.0	20.0
1,2-Dichlorobenzene	< 20.0	20.0
2-Methylphenol	< 20.0	20.0
bis(2-Chloroisopropyl)ether	< 20.0	20.0
4-Methylphenol	< 20.0	20.0
Hexachloroethane	< 20.0	20.0
N-Nitroso-di-n-propylamine	< 100	100
Nitrobenzene	< 20.0	20.0
Isophorone	< 20.0	20.0
2-Nitrophenol	< 20.0	20.0
2,4-Dimethylphenol	< 20.0	20.0
bis(2-Chloroethoxy)methane	< 20.0	20.0
2,4-Dichlorophenol	< 20.0	20.0
1,2,4-Trichlorobenzene	< 20.0	20.0
Naphthalene	< 20.0	20.0
4-Chloroanaline	< 20.0	20.0
Hexachlorobutadiene	< 20.0	20.0
4-Chloro-3-methylphenol	< 20.0	20.0
2-Methylnaphthalene	< 20.0	20.0
Hexachlorocyclopentadiene	< 20.0	20.0
2,4,5-Trichlorophenol	< 20.0	20.0
2,4,6-Trichlorophenol	< 20.0	20.0
2-Chloronaphthalene	< 20.0	20.0
2-Nitroanaline	< 20.0	20.0
Acenaphthylene	< 20.0	20.0
Dimethyl phthalate	< 20.0	20.0
2,6-Dinitrotoluene	< 20.0	20.0
3-Nitroanaline	< 20.0	20.0
Acenaphthene	< 20.0	20.0
2,4-Dinitrophenol	< 100	100
4-Nitrophenol	< 20.0	20.0
Dibenzofuran	< 20.0	20.0
2,4-Dinitrotoluene	< 20.0	20.0
	mg/Kg	mg/Kg

CDF001522

GEO Job# 9704102(E)-1997
Page 2 of 2

COMPOUNDS	RESULTS	REPORTING LIMIT
Diethyl phthalate	< 20.0	20.0
Fluorene	< 20.0	20.0
4-Chlorophenylphenyl ether	< 20.0	20.0
4-Nitroanaline	< 20.0	20.0
2-Methyl-4,6-dinitrophenol	< 100	100
N-Nitrosodiphenylamine	< 20.0	20.0
4-Bromphenylphenyl ether	< 20.0	20.0
Hexachlorobenzene	< 20.0	20.0
Pentachlorophenol	< 20.0	20.0
Phenanthrene	< 20.0	20.0
Anthracene	< 20.0	20.0
Carbazole	< 20.0	20.0
Di-n-butyl phthalate	< 20.0	20.0
Fluoranthene	< 20.0	20.0
Pyrene	< 20.0	20.0
Butyl benzyl phthalate	< 20.0	20.0
Benzo(a)anthracene	< 20.0	20.0
3,3'-Dichlorobenzidine	< 100	100
Chrysene	< 20.0	20.0
bis(2-Ethylhexyl) phthalate	< 20.0	20.0
Di-n-octyl phthalate	< 20.0	20.0
Benzo(b)fluoranthene	< 20.0	20.0
Benzo(k)fluoranthene	< 20.0	20.0
Benzo(a)pyrene	< 20.0	20.0
Indeno(1,2,3-cd)pyrene	< 20.0	20.0
Dibenzo(a,h)anthracene	< 20.0	20.0
Benzo(ghi)perylene	< 20.0	20.0
	mg/Kg	mg/Kg

COMPOUND	% SURROGATE RECOVERY	ACCEPTABLE RANGE
2-Fluorophenol	88	33 - 144
Phenol d5	78	62 - 120
Nitrobenzene d5	93	80 - 132
2-Fluorobiphenyl	74	67 - 105
2,4,6-Tribromophenol	101	24 - 135
Terphenyl d14	80	49 - 141

* Indicates surrogate recovery outside of acceptable range.

Analytical Methodology Information

EPA Method SW846-8270B, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
Extraction Date: 4/28/97
Initial Calibration Date: 04/17/97-05/01/97
Continuing Calibration Date: 04/30-05/02/97
Analyst: T. Lang

REVIEWED AND APPROVED BY Christie Thomas

CDF001523

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Report Issued To: Parsons Engineering Science
19101 Villaview Road, Suite 300
Cleveland, Ohio 44119

GEO Job# 9704102(F)-1998
Matrix Type: Soil
Samples Received: 04/22/97
Date Analyzed: 04/30-05/02/97
Analysis Reported: 05/06/97

Project Number: 731397.01000
Project Name: Canton Drop Forge

Sample Date: 04/18/97
Sample Description: CDF-4

GAS CHROMATOGRAPHY/MASS SPECTROMETRY FOR SEMI-VOLATILE ORGANICS IN SOIL

COMPOUNDS	RESULTS	REPORTING LIMIT
N-Nitrosodimethylamine	< 100	100
Phenol	< 20.0	20.0
2-Chlorophenol	< 20.0	20.0
bis(2-Chloroethyl)ether	< 20.0	20.0
1,3-Dichlorobenzene	< 20.0	20.0
1,4-Dichlorobenzene	< 20.0	20.0
1,2-Dichlorobenzene	< 20.0	20.0
2-Methylphenol	< 20.0	20.0
bis(2-Chloroisopropyl)ether	< 20.0	20.0
4-Methylphenol	< 20.0	20.0
Hexachloroethane	< 20.0	20.0
N-Nitroso-di-n-propylamine	< 100	100
Nitrobenzene	< 20.0	20.0
Isophorone	< 20.0	20.0
2-Nitrophenol	< 20.0	20.0
2,4-Dimethylphenol	< 20.0	20.0
bis(2-Chloroethoxy)methane	< 20.0	20.0
2,4-Dichlorophenol	< 20.0	20.0
1,2,4-Trichlorobenzene	< 20.0	20.0
Naphthalene	< 20.0	20.0
4-Chloroanaline	< 20.0	20.0
Hexachlorobutadiene	< 20.0	20.0
4-Chloro-3-methylphenol	< 20.0	20.0
2-Methylnaphthalene	< 20.0	20.0
Hexachlorocyclopentadiene	< 20.0	20.0
2,4,5-Trichlorophenol	< 20.0	20.0
2,4,6-Trichlorophenol	< 20.0	20.0
2-Chloronaphthalene	< 20.0	20.0
2-Nitroanaline	< 20.0	20.0
Acenaphthylene	< 20.0	20.0
Dimethyl phthalate	< 20.0	20.0
2,6-Dinitrotoluene	< 20.0	20.0
3-Nitroanaline	< 20.0	20.0
Acenaphthene	< 20.0	20.0
2,4-Dinitrophenol	< 100	100
4-Nitrophenol	< 20.0	20.0
Dibenzofuran	< 20.0	20.0
2,4-Dinitrotoluene	< 20.0	20.0
	mg/Kg	mg/Kg

CDF001524

GEO Job# 9704102(F)-1998

COMPOUNDS	RESULTS	REPORTING LIMIT
Diethyl phthalate	< 20.0	20.0
Fluorene	< 20.0	20.0
4-Chlorophenylphenyl ether	< 20.0	20.0
4-Nitroanaline	< 20.0	20.0
2-Methyl-4,6-dinitrophenol	< 100	100
N-Nitrosodiphenylamine	< 20.0	20.0
4-Bromphenylphenyl ether	< 20.0	20.0
Hexachlorobenzene	< 20.0	20.0
Pentachlorophenol	< 20.0	20.0
Phenanthrene	< 20.0	20.0
Anthracene	< 20.0	20.0
Carbazole	< 20.0	20.0
Di-n-butyl phthalate	< 20.0	20.0
Fluoranthene	< 20.0	20.0
Pyrene	< 20.0	20.0
Butyl benzyl phthalate	< 20.0	20.0
Benzo(a)anthracene	< 20.0	20.0
3,3'-Dichlorobenzidine	< 100	100
Chrysene	< 20.0	20.0
bis(2-Ethylhexyl) phthalate	< 20.0	20.0
Di-n-octyl phthalate	< 20.0	20.0
Benzo(b)fluoranthene	< 20.0	20.0
Benzo(k)fluoranthene	< 20.0	20.0
Benzo(a)pyrene	< 20.0	20.0
Indeno(1,2,3-cd)pyrene	< 20.0	20.0
Dibenzo(a,h)anthracene	< 20.0	20.0
Benzo(ghi)perylene	< 20.0	20.0
	mg/Kg	mg/Kg

COMPOUND	% SURROGATE RECOVERY	ACCEPTABLE RANGE
2-Fluorophenol	82	33 - 144
Phenol d5	72	62 - 120
Nitrobenzene d5	86	80 - 132
2-Fluorobiphenyl	95	67 - 105
2,4,6-Tribromophenol	92	24 - 135
Terphenyl d14	79	49 - 141

* Indicates surrogate recovery outside of acceptable range.

Analytical Methodology Information

EPA Method SW846-8270B, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
Extraction Date: 4/28/97
Initial Calibration Date: 04/17/97-05/01/97
Continuing Calibration Date: 04/30-05/02/97
Analyst: T. Lang

REVIEWED AND APPROVED BY Chuoth Thanh

CDF001525

GEO Analytical, Inc.

Report Issued To: Parsons Engineering Science
19101 Villaview Road, Suite 300
Cleveland, Ohio 44119

GEO Job# 9704102(G)-1999 Project Number: 731397.01000
Matrix Type: Soil
Samples Received: 04/22/97 Project Name: Canton Drop Forge
Date Analyzed: 04/30-05/03/97
Analysis Reported: 05/06/97

Sample Date: 04/18/97
Sample Description: CDF-5

GAS CHROMATOGRAPHY/MASS SPECTROMETRY FOR SEMI-VOLATILE ORGANICS IN SOIL

COMPOUNDS	RESULTS	REPORTING LIMIT
N-Nitrosodimethylamine	< 100	100
Phenol	< 20.0	20.0
2-Chlorophenol	< 20.0	20.0
bis(2-Chloroethyl)ether	< 20.0	20.0
1,3-Dichlorobenzene	< 20.0	20.0
1,4-Dichlorobenzene	< 20.0	20.0
1,2-Dichlorobenzene	< 20.0	20.0
2-Methylphenol	< 20.0	20.0
bis(2-Chloroisopropyl)ether	< 20.0	20.0
4-Methylphenol	< 20.0	20.0
Hexachloroethane	< 20.0	20.0
N-Nitroso-di-n-propylamine	< 100	100
Nitrobenzene	< 20.0	20.0
Isophorone	< 20.0	20.0
2-Nitrophenol	< 20.0	20.0
2,4-Dimethylphenol	< 20.0	20.0
bis(2-Chloroethoxy)methane	< 20.0	20.0
2,4-Dichlorophenol	< 20.0	20.0
1,2,4-Trichlorobenzene	< 20.0	20.0
Naphthalene	< 20.0	20.0
4-Chloroanaline	< 20.0	20.0
Hexachlorobutadiene	< 20.0	20.0
4-Chloro-3-methylphenol	< 20.0	20.0
2-Methylnaphthalene	< 20.0	20.0
Hexachlorocyclopentadiene	< 20.0	20.0
2,4,5-Trichlorophenol	< 20.0	20.0
2,4,6-Trichlorophenol	< 20.0	20.0
2-Chloronaphthalene	< 20.0	20.0
2-Nitroanaline	< 20.0	20.0
Acenaphthylene	< 20.0	20.0
Dimethyl phthalate	< 20.0	20.0
2,6-Dinitrotoluene	< 20.0	20.0
3-Nitroanaline	< 20.0	20.0
Acenaphthene	< 20.0	20.0
2,4-Dinitrophenol	< 100	100
4-Nitrophenol	< 20.0	20.0
Dibenzofuran	< 20.0	20.0
2,4-Dinitrotoluene	< 20.0	20.0
	mg/Kg	mg/Kg

CDF001526

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GEO Job# 9704102(G)-1999

COMPOUNDS	RESULTS	REPORTING LIMIT
Diethyl phthalate	< 20.0	20.0
Fluorene	< 20.0	20.0
4-Chlorophenylphenyl ether	< 20.0	20.0
4-Nitroanaline	< 20.0	20.0
2-Methyl-4,6-dinitrophenol	< 100	100
N-Nitrosodiphenylamine	< 20.0	20.0
4-Bromphenylphenyl ether	< 20.0	20.0
Hexachlorobenzene	< 20.0	20.0
Pentachlorophenol	< 20.0	20.0
Phenanthrene	< 20.0	20.0
Anthracene	< 20.0	20.0
Carbazole	< 20.0	20.0
Di-n-butyl phthalate	< 20.0	20.0
Fluoranthene	< 20.0	20.0
Pyrene	< 20.0	20.0
Butyl benzyl phthalate	< 20.0	20.0
Benzo(a)anthracene	< 20.0	20.0
3,3'-Dichlorobenzidine	< 100	100
Chrysene	< 20.0	20.0
bis(2-Ethylhexyl) phthalate	< 20.0	20.0
Di-n-octyl phthalate	< 20.0	20.0
Benzo(b)fluoranthene	< 20.0	20.0
Benzo(k)fluoranthene	< 20.0	20.0
Benzo(a)pyrene	< 20.0	20.0
Indeno(1,2,3-cd)pyrene	< 20.0	20.0
Dibenzo(a,h)anthracene	< 20.0	20.0
Benzo(ghi)perylene	< 20.0	20.0
	mg/Kg	mg/Kg

COMPOUND	% SURROGATE RECOVERY	ACCEPTABLE RANGE
2-Fluorophenol	80	33 - 144
Phenol d5	71	62 - 120
Nitrobenzene d5	91	80 - 132
2-Fluorobiphenyl	101	67 - 105
2,4,6-Tribromophenol	94	24 - 135
Terphenyl d14	84	49 - 141

* Indicates surrogate recovery outside of acceptable range.

Analytical Methodology Information

EPA Method SW846-8270B, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
Extraction Date: 4/28/97
Initial Calibration Date: 04/17/97-05/01/97
Continuing Calibration Date: 04/30-05/03/97
Analyst: T. Lang

REVIEWED AND APPROVED BY Christi Thaxton

CDF001527

GEO Analytical Inc.

Report Issued To: Parsons Engineering Science
19101 Villaview Road, Suite 300
Cleveland, Ohio 44119

GEO Job# 9704102(H)-2000
Matrix Type: Soil
Samples Received: 04/22/97
Date Analyzed: 04/30-05/03/97
Analysis Reported: 05/06/97

Project Number: 731397.01000
Project Name: Canton Drop Forge

Sample Date: 04/18/97
Sample Description: CDF-6

GAS CHROMATOGRAPHY/MASS SPECTROMETRY FOR SEMI-VOLATILE ORGANICS IN SOIL

COMPOUNDS	RESULTS	REPORTING LIMIT
N-Nitrosodimethylamine	< 100	100
Phenol	< 20.0	20.0
2-Chlorophenol	< 20.0	20.0
bis(2-Chloroethyl)ether	< 20.0	20.0
1,3-Dichlorobenzene	< 20.0	20.0
1,4-Dichlorobenzene	< 20.0	20.0
1,2-Dichlorobenzene	< 20.0	20.0
2-Methylphenol	< 20.0	20.0
bis(2-Chloroisopropyl)ether	< 20.0	20.0
4-Methylphenol	< 20.0	20.0
Hexachloroethane	< 20.0	20.0
N-Nitroso-di-n-propylamine	< 20.0	20.0
Nitrobenzene	< 100	100
Isophorone	< 20.0	20.0
2-Nitrophenol	< 20.0	20.0
2,4-Dimethylphenol	< 20.0	20.0
bis(2-Chloroethoxy)methane	< 20.0	20.0
2,4-Dichlorophenol	< 20.0	20.0
1,2,4-Trichlorobenzene	< 20.0	20.0
Naphthalene	< 20.0	20.0
4-Chloroanaline	< 20.0	20.0
Hexachlorobutadiene	< 20.0	20.0
4-Chloro-3-methylphenol	< 20.0	20.0
2-Methylnaphthalene	< 20.0	20.0
Hexachlorocyclopentadiene	< 20.0	20.0
2,4,5-Trichlorophenol	< 20.0	20.0
2,4,6-Trichlorophenol	< 20.0	20.0
2-Chloronaphthalene	< 20.0	20.0
2-Nitroanaline	< 20.0	20.0
Acenaphthylene	< 20.0	20.0
Dimethyl phthalate	< 20.0	20.0
2,6-Dinitrotoluene	< 20.0	20.0
3-Nitroanaline	< 20.0	20.0
Acenaphthene	< 20.0	20.0
2,4-Dinitrophenol	< 100	100
4-Nitrophenol	< 20.0	20.0
Dibenzofuran	< 20.0	20.0
2,4-Dinitrotoluene	< 20.0	20.0
	mg/Kg	mg/Kg

CDF001528

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GEO Job# 9704102(H)-2000

COMPOUNDS	RESULTS	REPORTING LIMIT
Diethyl phthalate	< 20.0	20.0
Fluorene	< 20.0	20.0
4-Chlorophenylphenyl ether	< 20.0	20.0
4-Nitroanaline	< 20.0	20.0
2-Methyl-4,6-dinitrophenol	< 100	100
N-Nitrosodiphenylamine	< 20.0	20.0
4-Bromphenylphenyl ether	< 20.0	20.0
Hexachlorobenzene	< 20.0	20.0
Pentachlorophenol	< 20.0	20.0
Phenanthrene	< 20.0	20.0
Anthracene	< 20.0	20.0
Carbazole	< 20.0	20.0
Di-n-butyl phthalate	< 20.0	20.0
Fluoranthene	< 20.0	20.0
Pyrene	< 20.0	20.0
Butyl benzyl phthalate	< 20.0	20.0
Benzo(a)anthracene	< 20.0	20.0
3,3'-Dichlorobenzidine	< 100	100
Chrysene	< 20.0	20.0
bis(2-Ethylhexyl) phthalate	< 20.0	20.0
Di-n-octyl phthalate	< 20.0	20.0
Benzo(b)fluoranthene	< 20.0	20.0
Benzo(k)fluoranthene	< 20.0	20.0
Benzo(a)pyrene	< 20.0	20.0
Indeno(1,2,3-cd)pyrene	< 20.0	20.0
Dibenzo(a,h)anthracene	< 20.0	20.0
Benzo(ghi)perylene	< 20.0	20.0
	mg/Kg	mg/Kg

COMPOUND	% SURROGATE RECOVERY	ACCEPTABLE RANGE
2-Fluorophenol	86	33 - 144
Phenol d5	75	62 - 120
Nitrobenzene d5	84	80 - 132
2-Fluorobiphenyl	98	67 - 105
2,4,6-Tribromophenol	88	24 - 135
Terphenyl d14	89	49 - 141

* Indicates surrogate recovery outside of acceptable range.

Analytical Methodology Information

EPA Method SW846-8270B, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
Extraction Date: 4/28/97
Initial Calibration Date: 04/17/97-05/01/97
Continuing Calibration Date: 04/30-05/03/97
Analyst: T. Lang

REVIEWED AND APPROVED BY Christy Traxler

CDF001529

GEO Analytical, Inc.

Report Issued To: Parsons Engineering Science
19101 Villaview Road, Suite 300
Cleveland, Ohio 44119

GEO Job# 9704102(I)-2001
Matrix Type: Soil
Samples Received: 04/22/97
Date Analyzed: 04/30-05/05/97
Analysis Reported: 05/06/97

Project Number: 731397.01000
Project Name: Canton Drop Forge

Sample Date: 04/18/97
Sample Description: CDF-7

GAS CHROMATOGRAPHY/MASS SPECTROMETRY FOR SEMI-VOLATILE ORGANICS IN SOIL

COMPOUNDS	RESULTS	REPORTING LIMIT
N-Nitrosodimethylamine	< 100	100
Phenol	< 20.0	20.0
2-Chlorophenol	< 20.0	20.0
bis(2-Chloroethyl)ether	< 20.0	20.0
1,3-Dichlorobenzene	< 20.0	20.0
1,4-Dichlorobenzene	< 20.0	20.0
1,2-Dichlorobenzene	< 20.0	20.0
2-Methylphenol	< 20.0	20.0
bis(2-Chloroisopropyl)ether	< 20.0	20.0
4-Methylphenol	< 20.0	20.0
Hexachloroethane	< 20.0	20.0
N-Nitroso-di-n-propylamine	< 100	100
Nitrobenzene	< 20.0	20.0
Isophorone	< 20.0	20.0
2-Nitrophenol	< 20.0	20.0
2,4-Dimethylphenol	< 20.0	20.0
bis(2-Chloroethoxy)methane	< 20.0	20.0
2,4-Dichlorophenol	< 20.0	20.0
1,2,4-Trichlorobenzene	< 20.0	20.0
Naphthalene	< 20.0	20.0
4-Chloroanaline	< 20.0	20.0
Hexachlorobutadiene	< 20.0	20.0
4-Chloro-3-methylphenol	< 20.0	20.0
2-Methylnaphthalene	< 20.0	20.0
Hexachlorocyclopentadiene	< 20.0	20.0
2,4,5-Trichlorophenol	< 20.0	20.0
2,4,6-Trichlorophenol	< 20.0	20.0
2-Chloronaphthalene	< 20.0	20.0
2-Nitroanaline	< 20.0	20.0
Acenaphthylene	< 20.0	20.0
Dimethyl phthalate	< 20.0	20.0
2,6-Dinitrotoluene	< 20.0	20.0
3-Nitroanaline	< 20.0	20.0
Acenaphthene	< 20.0	20.0
2,4-Dinitrophenol	< 100	100
4-Nitrophenol	< 20.0	20.0
Dibenzofuran	< 20.0	20.0
2,4-Dinitrotoluene	< 20.0	20.0
	mg/Kg	mg/Kg

CDF001530

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GEO Job# 9704102(I)-2001

COMPOUNDS	RESULTS	REPORTING LIMIT
Diethyl phthalate	< 20.0	20.0
Fluorene	< 20.0	20.0
4-Chlorophenylphenyl ether	< 20.0	20.0
4-Nitroanaline	< 20.0	20.0
2-Methyl-4,6-dinitrophenol	< 100	100
N-Nitrosodiphenylamine	< 20.0	20.0
4-Bromphenylphenyl ether	< 20.0	20.0
Hexachlorobenzene	< 20.0	20.0
Pentachlorophenol	< 20.0	20.0
Phenanthrene	< 20.0	20.0
Anthracene	< 20.0	20.0
Carbazole	< 20.0	20.0
Di-n-butyl phthalate	< 20.0	20.0
Fluoranthene	< 20.0	20.0
Pyrene	25.2	20.0
Butyl benzyl phthalate	< 20.0	20.0
Benzo(a)anthracene	< 20.0	20.0
3,3'-Dichlorobenzidine	< 100	100
Chrysene	22.5	20.0
bis(2-Ethylhexyl) phthalate	< 20.0	20.0
Di-n-octyl phthalate	< 20.0	20.0
Benzo(b)fluoranthene	< 20.0	20.0
Benzo(k)fluoranthene	< 20.0	20.0
Benzo(a)pyrene	< 20.0	20.0
Indeno(1,2,3-cd)pyrene	< 20.0	20.0
Dibenzo(a,h)anthracene	< 20.0	20.0
Benzo(ghi)perylene	< 20.0	20.0
	mg/Kg	mg/Kg

COMPOUND	% SURROGATE RECOVERY	ACCEPTABLE RANGE
2-Fluorophenol	92	33 - 144
Phenol d5	64	62 - 120
Nitrobenzene d5	75*	80 - 132
2-Fluorobiphenyl	74	67 - 105
2,4,6-Tribromophenol	87	24 - 135
Terphenyl d14	100	49 - 141

* Indicates surrogate recovery outside of acceptable range.
***Analytical results for this sample are estimated concentration due to low surrogate recovery.

Analytical Methodology Information

EPA Method SW846-8270B, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
Extraction Date: 4/28/97
Initial Calibration Date: 04/17/97-05/01/97
Continuing Calibration Date: 04/30-05/05/97
Analyst: T. Lang

REVIEWED AND APPROVED BY Christie Maxon

CDF001531

Report Issued To: Parsons Engineering Science
19101 Villaview Road, Suite 300
Cleveland, Ohio 44119

GEO Job# 9704102(J)-2002
Matrix Type: Soil
Samples Received: 04/22/97
Date Analyzed: 05/02-05/97
Analysis Reported: 05/06/97

Project Number: 731397.01000
Project Name: Canton Drop Forge

Sample Date: 04/18/97
Sample Description: CDF-8

GAS CHROMATOGRAPHY/MASS SPECTROMETRY FOR SEMI-VOLATILE ORGANICS IN SOIL

COMPOUNDS	RESULTS	REPORTING LIMIT
N-Nitrosodimethylamine	< 100	100
Phenol	< 20.0	20.0
2-Chlorophenol	< 20.0	20.0
bis(2-Chloroethyl)ether	< 20.0	20.0
1,3-Dichlorobenzene	< 20.0	20.0
1,4-Dichlorobenzene	< 20.0	20.0
1,2-Dichlorobenzene	< 20.0	20.0
2-Methylphenol	< 20.0	20.0
bis(2-Chloroisopropyl)ether	< 20.0	20.0
4-Methylphenol	< 20.0	20.0
Hexachloroethane	< 20.0	20.0
N-Nitroso-di-n-propylamine	< 100	100
Nitrobenzene	< 20.0	20.0
Isophorone	< 20.0	20.0
2-Nitrophenol	< 20.0	20.0
2,4-Dimethylphenol	< 20.0	20.0
bis(2-Chloroethoxy)methane	< 20.0	20.0
2,4-Dichlorophenol	< 20.0	20.0
1,2,4-Trichlorobenzene	< 20.0	20.0
Naphthalene	< 20.0	20.0
4-Chloroanaline	< 20.0	20.0
Hexachlorobutadiene	< 20.0	20.0
4-Chloro-3-methylphenol	< 20.0	20.0
2-Methylnaphthalene	< 20.0	20.0
Hexachlorocyclopentadiene	< 20.0	20.0
2,4,5-Trichlorophenol	< 20.0	20.0
2,4,6-Trichlorophenol	< 20.0	20.0
2-Chloronaphthalene	< 20.0	20.0
2-Nitroanaline	< 20.0	20.0
Acenaphthylene	< 20.0	20.0
Dimethyl phthalate	< 20.0	20.0
2,6-Dinitrotoluene	< 20.0	20.0
3-Nitroanaline	< 20.0	20.0
Acenaphthene	< 20.0	20.0
2,4-Dinitrophenol	< 100	100
4-Nitrophenol	< 20.0	20.0
Dibenzofuran	< 20.0	20.0
2,4-Dinitrotoluene	< 20.0	20.0
	mg/Kg	mg/Kg

CDF001532

GEO Job# 9704102(J)-2002
Page 2 of 2

COMPOUNDS	RESULTS	REPORTING LIMIT
Diethyl phthalate	< 20.0	20.0
Fluorene	< 20.0	20.0
4-Chlorophenylphenyl ether	< 20.0	20.0
4-Nitroanaline	< 20.0	20.0
2-Methyl-4,6-dinitrophenol	< 100	100
N-Nitrosodiphenylamine	< 20.0	20.0
4-Bromphenylphenyl ether	< 20.0	20.0
Hexachlorobenzene	< 20.0	20.0
Pentachlorophenol	< 20.0	20.0
Phenanthrene	< 20.0	20.0
Anthracene	< 20.0	20.0
Carbazole	< 20.0	20.0
Di-n-butyl phthalate	< 20.0	20.0
Fluoranthene	< 20.0	20.0
Pyrene	20.5	20.0
Butyl benzyl phthalate	< 20.0	20.0
Benzo(a)anthracene	< 20.0	20.0
3,3'-Dichlorobenzidine	< 100	100
Chrysene	25.8	20.0
bis(2-Ethylhexyl) phthalate	< 20.0	20.0
Di-n-octyl phthalate	< 20.0	20.0
Benzo(b)fluoranthene	< 20.0	20.0
Benzo(k)fluoranthene	< 20.0	20.0
Benzo(a)pyrene	< 20.0	20.0
Indeno(1,2,3-cd)pyrene	< 20.0	20.0
Dibenzo(a,h)anthracene	< 20.0	20.0
Benzo(ghi)perylene	< 20.0	20.0
	mg/Kg	mg/Kg

COMPOUND	% SURROGATE RECOVERY	ACCEPTABLE RANGE
2-Fluorophenol	75	33 - 144
Phenol d5	59*	62 - 120
Nitrobenzene d5	72*	80 - 132
2-Fluorobiphenyl	102	67 - 105
2,4,6-Tribromophenol	85	24 - 135
Terphenyl d14	92	49 - 141

* Indicates surrogate recovery outside of acceptable range.
***Analytical results for this sample are estimated concentration due to low surrogate recovery.

Analytical Methodology Information

EPA Method SW846-8270B, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
Extraction Date: 4/28/97
Initial Calibration Date: 05/01/97
Continuing Calibration Date: 05/02-05/97
Analyst: T. Lang

REVIEWED AND APPROVED BY Christie Mason

CDF001533

GEO Analytical, Inc.

Report Issued To: Parsons Engineering Science
19101 Villaview Road, Suite 300
Cleveland, Ohio 44119

GEO Job# 9704102(K)-2003
Matrix Type: Soil
Samples Received: 04/22/97
Date Analyzed: 05/02-05/97
Analysis Reported: 05/06/97

Project Number: 731397.01000
Project Name: Canton Drop Forge

Sample Date: **04/18/97**
Sample Description: **CDF-9**

GAS CHROMATOGRAPHY/MASS SPECTROMETRY FOR SEMI-VOLATILE ORGANICS IN SOIL

COMPOUNDS	RESULTS	REPORTING LIMIT
N-Nitrosodimethylamine	< 100	100
Phenol	< 20.0	20.0
2-Chlorophenol	< 20.0	20.0
bis(2-Chloroethyl)ether	< 20.0	20.0
1,3-Dichlorobenzene	< 20.0	20.0
1,4-Dichlorobenzene	< 20.0	20.0
1,2-Dichlorobenzene	< 20.0	20.0
2-Methylphenol	< 20.0	20.0
bis(2-Chloroisopropyl)ether	< 20.0	20.0
4-Methylphenol	< 20.0	20.0
Hexachloroethane	< 20.0	20.0
N-Nitroso-di-n-propylamine	< 20.0	20.0
Nitrobenzene	< 100	100
Isophorone	< 20.0	20.0
2-Nitrophenol	< 20.0	20.0
2,4-Dimethylphenol	< 20.0	20.0
bis(2-Chloroethoxy)methane	< 20.0	20.0
2,4-Dichlorophenol	< 20.0	20.0
1,2,4-Trichlorobenzene	< 20.0	20.0
Naphthalene	< 20.0	20.0
4-Chloroanaline	< 20.0	20.0
Hexachlorobutadiene	< 20.0	20.0
4-Chloro-3-methylphenol	< 20.0	20.0
2-Methylnaphthalene	< 20.0	20.0
Hexachlorocyclopentadiene	< 20.0	20.0
2,4,5-Trichlorophenol	< 20.0	20.0
2,4,6-Trichlorophenol	< 20.0	20.0
2-Chloronaphthalene	< 20.0	20.0
2-Nitroanaline	< 20.0	20.0
Acenaphthylene	< 20.0	20.0
Dimethyl phthalate	< 20.0	20.0
2,6-Dinitrotoluene	< 20.0	20.0
3-Nitroanaline	< 20.0	20.0
Acenaphthene	< 20.0	20.0
2,4-Dinitrophenol	< 100	100
4-Nitrophenol	< 20.0	20.0
Dibenzofuran	< 20.0	20.0
2,4-Dinitrotoluene	< 20.0	20.0
	mg/Kg	mg/Kg

CDF001534

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GEO Job# 9704102(K)-2003

COMPOUNDS	RESULTS	REPORTING LIMIT
Diethyl phthalate	< 20.0	20.0
Fluorene	< 20.0	20.0
4-Chlorophenylphenyl ether	< 20.0	20.0
4-Nitroanaline	< 20.0	20.0
2-Methyl-4,6-dinitrophenol	< 100	100
N-Nitrosodiphenylamine	< 20.0	20.0
4-Bromphenylphenyl ether	< 20.0	20.0
Hexachlorobenzene	< 20.0	20.0
Pentachlorophenol	< 20.0	20.0
Phenanthrene	< 20.0	20.0
Anthracene	< 20.0	20.0
Carbazole	< 20.0	20.0
Di-n-butyl phthalate	< 20.0	20.0
Fluoranthene	< 20.0	20.0
Pyrene	22.5	20.0
Butyl benzyl phthalate	< 20.0	20.0
Benzo(a)anthracene	< 20.0	20.0
3,3'-Dichlorobenzidine	< 100	100
Chrysene	22.1	20.0
bis(2-Ethylhexyl) phthalate	< 20.0	20.0
Di-n-octyl phthalate	< 20.0	20.0
Benzo(b)fluoranthene	< 20.0	20.0
Benzo(k)fluoranthene	< 20.0	20.0
Benzo(a)pyrene	< 20.0	20.0
Indeno(1,2,3-cd)pyrene	< 20.0	20.0
Dibenzo(a,h)anthracene	< 20.0	20.0
Benzo(ghi)perylene	< 20.0	20.0
	mg/Kg	mg/Kg

COMPOUND	% SURROGATE RECOVERY	ACCEPTABLE RANGE
2-Fluorophenol	80	33 - 144
Phenol d5	60*	62 - 120
Nitrobenzene d5	78*	80 - 132
2-Fluorobiphenyl	92	67 - 105
2,4,6-Tribromophenol	71	24 - 135
Terphenyl d14	94	49 - 141

* Indicates surrogate recovery outside of acceptable range.
***Analytical results for this sample are estimated concentration due to low surrogate recovery.

Analytical Methodology Information

EPA Method SW846-8270B, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
Extraction Date: 4/28/97
Initial Calibration Date: 05/01/97
Continuing Calibration Date: 05/02-05/97
Analyst: T. Lang

REVIEWED AND APPROVED BY Christie Thaxton

CDF001535

GEO Analytical, Inc.

Report Issued To: Parsons Engineering Science
19101 Villaview Road, Suite 300
Cleveland, Ohio 44119

GEO Job# 9704102(L)-2004
Matrix Type: Soil
Samples Received: 04/22/97
Date Analyzed: 05/02/97
Analysis Reported: 05/06/97

Project Number: 731397.01000
Project Name: Canton Drop Forge

Sample Date: 04/18/97
Sample Description: CDF-10

GAS CHROMATOGRAPHY/MASS SPECTROMETRY FOR SEMI-VOLATILE ORGANICS IN SOIL

COMPOUNDS	RESULTS	REPORTING LIMIT
N-Nitrosodimethylamine	< 100	100
Phenol	< 20.0	20.0
2-Chlorophenol	< 20.0	20.0
bis(2-Chloroethyl)ether	< 20.0	20.0
1,3-Dichlorobenzene	< 20.0	20.0
1,4-Dichlorobenzene	< 20.0	20.0
1,2-Dichlorobenzene	< 20.0	20.0
2-Methylphenol	< 20.0	20.0
bis(2-Chloroisopropyl)ether	< 20.0	20.0
4-Methylphenol	< 20.0	20.0
Hexachloroethane	< 20.0	20.0
N-Nitroso-di-n-propylamine	< 100	100
Nitrobenzene	< 20.0	20.0
Isophorone	< 20.0	20.0
2-Nitrophenol	< 20.0	20.0
2,4-Dimethylphenol	< 20.0	20.0
bis(2-Chloroethoxy)methane	< 20.0	20.0
2,4-Dichlorophenol	< 20.0	20.0
1,2,4-Trichlorobenzene	< 20.0	20.0
Naphthalene	< 20.0	20.0
4-Chloroanaline	< 20.0	20.0
Hexachlorobutadiene	< 20.0	20.0
4-Chloro-3-methylphenol	< 20.0	20.0
2-Methylnaphthalene	< 20.0	20.0
Hexachlorocyclopentadiene	< 20.0	20.0
2,4,5-Trichlorophenol	< 20.0	20.0
2,4,6-Trichlorophenol	< 20.0	20.0
2-Chloronaphthalene	< 20.0	20.0
2-Nitroanaline	< 20.0	20.0
Acenaphthylene	< 20.0	20.0
Dimethyl phthalate	< 20.0	20.0
2,6-Dinitrotoluene	< 20.0	20.0
3-Nitroanaline	< 20.0	20.0
Acenaphthene	< 20.0	20.0
2,4-Dinitrophenol	< 100	100
4-Nitrophenol	< 20.0	20.0
Dibenzofuran	< 20.0	20.0
2,4-Dinitrotoluene	< 20.0	20.0
	mg/Kg	mg/Kg

CDF001536

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GEO Job# 9704102(L)-2004
Page 2 of 2

COMPOUNDS	RESULTS	REPORTING LIMIT
Diethyl phthalate	< 20.0	20.0
Fluorene	< 20.0	20.0
4-Chlorophenylphenyl ether	< 20.0	20.0
4-Nitroanaline	< 20.0	20.0
2-Methyl-4,6-dinitrophenol	< 100	100
N-Nitrosodiphenylamine	< 20.0	20.0
4-Bromphenylphenyl ether	< 20.0	20.0
Hexachlorobenzene	< 20.0	20.0
Pentachlorophenol	< 20.0	20.0
Phenanthrene	< 20.0	20.0
Anthracene	< 20.0	20.0
Carbazole	< 20.0	20.0
Di-n-butyl phthalate	< 20.0	20.0
Fluoranthene	< 20.0	20.0
Pyrene	< 20.0	20.0
Butyl benzyl phthalate	< 20.0	20.0
Benzo(a)anthracene	< 20.0	20.0
3,3'-Dichlorobenzidine	< 100	100
Chrysene	< 20.0	20.0
bis(2-Ethylhexyl) phthalate	< 20.0	20.0
Di-n-octyl phthalate	< 20.0	20.0
Benzo(b)fluoranthene	< 20.0	20.0
Benzo(k)fluoranthene	< 20.0	20.0
Benzo(a)pyrene	< 20.0	20.0
Indeno(1,2,3-cd)pyrene	< 20.0	20.0
Dibenzo(a,h)anthracene	< 20.0	20.0
Benzo(ghi)perylene	< 20.0	20.0
	mg/Kg	mg/Kg

COMPOUND	% SURROGATE RECOVERY	ACCEPTABLE RANGE
2-Fluorophenol	88	33 - 144
Phenol d5	76	62 - 120
Nitrobenzene d5	90	80 - 132
2-Fluorobiphenyl	98	67 - 105
2,4,6-Tribromophenol	98	24 - 135
Terphenyl d14	82	49 - 141

* Indicates surrogate recovery outside of acceptable range.

Analytical Methodology Information

EPA Method SW846-8270B, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
Extraction Date: 4/28/97
Initial Calibration Date: 05/01/97
Continuing Calibration Date: 05/02/97
Analyst: T. Lang

REVIEWED AND APPROVED BY Christie Thomm

CDF001537

Report Issued To: Parsons Engineering Science
19101 Villaview Road, Suite 300
Cleveland, Ohio 44119

GEO Job# 9704102(M)-2005
Matrix Type: Water
Samples Received: 04/22/97
Date Analyzed: 04/23/97
Analysis Reported: 04/24/97

Project Number: 731397.01000
Project Name: Canton Drop Forge

Sample Date: 04/18/97
Sample Description: Trip Blank

GAS CHROMATOGRAPHY/MASS SPECTROMETRY FOR SEMI-VOLATILE ORGANICS IN WATER

COMPOUNDS	RESULTS	REPORTING LIMIT
N-Nitrosodimethylamine	< 25.0	25.0
Phenol	< 5.0	5.0
2-Chlorophenol	< 5.0	5.0
bis(2-Chloroethyl)ether	< 5.0	5.0
1,3-Dichlorobenzene	< 5.0	5.0
1,4-Dichlorobenzene	< 5.0	5.0
1,2-Dichlorobenzene	< 5.0	5.0
2-Methylphenol	< 5.0	5.0
bis(2-Chloroisopropyl)ether	< 5.0	5.0
4-Methylphenol	< 5.0	5.0
Hexachloroethane	< 5.0	5.0
N-Nitroso-di-n-propylamine	< 25.0	25.0
Nitrobenzene	< 5.0	5.0
Isophorone	< 5.0	5.0
2-Nitrophenol	< 5.0	5.0
2,4-Dimethylphenol	< 5.0	5.0
bis(2-Chloroethoxy)methane	< 5.0	5.0
2,4-Dichlorophenol	< 5.0	5.0
1,2,4-Trichlorobenzene	< 5.0	5.0
Naphthalene	< 5.0	5.0
4-Chloroanaline	< 5.0	5.0
Hexachlorobutadiene	< 5.0	5.0
4-Chloro-3-methylphenol	< 5.0	5.0
2-Methylnaphthalene	< 5.0	5.0
Hexachlorocyclopentadiene	< 5.0	5.0
2,4,5-Trichlorophenol	< 5.0	5.0
2,4,6-Trichlorophenol	< 5.0	5.0
2-Chloronaphthalene	< 5.0	5.0
2-Nitroanaline	< 5.0	5.0
Acenaphthylene	< 5.0	5.0
Dimethyl phthalate	< 5.0	5.0
2,6-Dinitrotoluene	< 5.0	5.0
3-Nitroanaline	< 5.0	5.0
Acenaphthene	< 5.0	5.0
2,4-Dinitrophenol	< 25.0	25.0
4-Nitrophenol	< 5.0	5.0
Dibenzofuran	< 5.0	5.0
2,4-Dinitrotoluene	< 5.0	5.0
	ug/L	ug/L

CDF001538

GEO Job# :9704102(M)-2005

COMPOUNDS	RESULTS	REPORTING LIMIT
Diethyl phthalate	< 5.0	5.0
Fluorene	< 5.0	5.0
4-Chlorophenylphenyl ether	< 5.0	5.0
4-Nitroanaline	< 5.0	5.0
2-Methyl-4,6-dinitrophenol	< 25.0	25.0
N-Nitrosodiphenylamine	< 5.0	5.0
4-Bromphenylphenyl ether	< 5.0	5.0
Hexachlorobenzene	< 5.0	5.0
Pentachlorophenol	< 5.0	5.0
Phenanthrene	< 5.0	5.0
Anthracene	< 5.0	5.0
Carbazole	< 5.0	5.0
Di-n-butyl phthalate	< 5.0	5.0
Fluoranthene	< 5.0	5.0
Pyrene	< 5.0	5.0
Butyl benzyl phthalate	< 5.0	5.0
Benzo(a)anthracene	< 5.0	5.0
3,3'-Dichlorobenzidine	< 25.0	25.0
Chrysene	< 5.0	5.0
bis(2-Ethylhexyl) phthalate	< 5.0	5.0
Di-n-octyl phthalate	< 5.0	5.0
Benzo(b)fluoranthene	< 5.0	5.0
Benzo(k)fluoranthene	< 5.0	5.0
Benzo(a)pyrene	< 2.0	2.0
Indeno(1,2,3-cd)pyrene	< 5.0	5.0
Dibenzo(a,h)anthracene	< 5.0	5.0
Benzo(ghi)perylene	< 5.0	5.0
	ug/L	ug/L

COMPOUND	% SURROGATE RECOVERY	ACCEPTABLE RANGE
2-Fluorophenol	50	35-110
Phenol d5	27	10 -110
Nitrobenzene d5	68	35 -114
2-Fluorobiphenyl	72	43 -116
2,4,6-Tribromophenol	89	10 -123
Terphenyl d14	72	33 -141

* indicates surrogate recovery outside of acceptable range.

Analytical Methodology Information

EPA Method SW846-8270B, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
Extraction Date: 4/28/97
Initial Calibration Date: 04/17/97
Continuing Calibration Date: 04/23/97
Analyst: T. Lang

ANALYSIS REVIEWED AND APPROVED BY Christa Thaxton

CDF001539

9263 Ravenna Rd. • Suite A-7 • Twinsburg, Ohio 44087 • Phone 216 963 6990 • Fax 216 963 6975

GEO Analytical, Inc.

Quality Control Report
Total Petroleum Hydrocarbons (GRO) in Soil by EPA Method SW846-8015 (modified)

Client ID : Parsons Engineering Science **Client Project :** Canton Drop Forge 731397.01000

Lab Project Number : 9704102 **Date Analyzed :** 04/24-26/97

SOIL BLANK SUMMARY

Compounds Identified	Amount	Units
Gasoline Range Organics	< 4.0	mg/Kg

This soil method blank applies to the following samples, MS and MSD

SOIL SAMPLE DATA

#	Laboratory Sample Number	Client Sample ID
	Blank	N/A
	Matrix Spike-Lab Soil	"
	Matrix Duplicate Spike-Lab Soil	"
1	1995	CDF-1
2	1996	CDF-2
3	1997	CDF-3
4	1998	CDF-4
5	1999	CDF-5
6	2000	CDF-6
7	2001	CDF-7
8	2002	CDF-8
9	2003	CDF-9
10	2004	CDF-10

SOIL MATRIX SPIKE RECOVERY DATA

Compounds	Units	MS Conc.	MS recovery %	MSD Conc.	MSD recovery %	RPD	QC Limits Recovery	QC Limits RPD
Total Petroleum Hydrocarbons	mg/Kg	7.33	98	6.93	92	6	54 - 118	23

RPD: 0 out of 1 outside limits
Spike Recovery: 0 out of 2 outside limits

CDF001540

GEO Analytical, Inc.

Quality Control Report
Total Petroleum Hydrocarbons (DRO) in Soil by EPA Method SW846-8015 (modified)

Client ID : Parsons Engineering Science **Client Project :** Canton Drop Forge 731397.01000

Lab Project Number : 9704102 **Date Analyzed :** 04/24-26/97

SOIL BLANK SUMMARY

Compounds Identified	Amount	Units
Diesel Range Organics	< 4.0	mg/Kg

This soil method blank applies to the following samples, MS and MSD

SOIL SAMPLE DATA

#	Laboratory Sample Number	Client Sample ID
	Blank	N/A
	Matrix Spike-1458	"
	Matrix Duplicate Spike-1458	"
1	1458	"
2	1995	CDF-1
3	1996	CDF-2
4	1997	CDF-3
5		
6		
7		
8		

SOIL MATRIX SPIKE RECOVERY DATA

Compounds	Units	MS Conc.	MS recovery %	MSD Conc.	MSD recovery %	RPD	QC Limits Recovery	QC Limits RPD
Total Petroleum Hydrocarbons	mg/Kg	217	72*	219	72*	1	75-120	33

RPD : 0 out of 1 outside limits
Spike Recovery : 2* out of 2 outside limits

*Note- The laboratory control sample (LCS) run for the parameters above was within the established limits. The analysis is in control; however, the matrix spike data for the QC sample above was outside of the acceptable limits for Total Petroleum Hydrocarbons. The data associated with that specific sample was flagged as an estimated concentration for Total Petroleum Hydrocarbons due to a matrix effect.

CDF001541

GEO Analytical, Inc.

Quality Control Report
Total Petroleum Hydrocarbons (DRO) in Soil by EPA Method SW846-8015 (modified)

Client ID : Parsons Engineering Science **Client Project :** Canton Drop Forge 731397.01000
Lab Project Number : 9704102 **Date Analyzed :** 04/24-26/97

SOIL BLANK SUMMARY

Compounds Identified	Amount	Units
Diesel Range Organics	< 4.0	mg/Kg

This soil method blank applies to the following samples, MS and MSD

SOIL SAMPLE DATA

#	Laboratory Sample Number	Client Sample ID
	Blank	N/A
	Matrix Spike-Lab Soil	"
	Matrix Duplicate Spike-Lab Soil	"
1	1998	CDF-4
2	1999	CDF-5
3	2000	CDF-6
4	2001	CDF-7
5	2002	CDF-8
6	2003	CDF-9
7	2004	CDF-10
8		

SOIL MATRIX SPIKE RECOVERY DATA

Compounds	Units	MS Conc.	MS recovery %	MSD Conc.	MSD recovery %	RPD	QC Limits Recovery	QC Limits RPD
Total Petroleum Hydrocarbons	mg/Kg	307	102	300	100	2	75-120	33

RPD : 0 out of 1 outside limits
Spike Recovery : 0 out of 2 outside limits

CDF001542

GEO Analytical, Inc.

Quality Control Report
Total Petroleum Hydrocarbons in Soil by EPA Method 418.1

Client ID: Parsons Engineering Science **Client Project :** Canton Drop Forge 731397.01000

Lab Project Number : 9704102 **Date Analyzed :** 04/25-28/97

SOILBLANK SUMMARY

Compounds Identified	Amount	Units
Total Petroleum Hydrocarbons	< 4.0	mg/Kg

This soil method blank applies to the following samples, MS and MSD.

SOIL SAMPLE DATA

#	Laboratory Sample Number	Client Sample ID
	Blank	N/A
	Matrix Spike-1901	"
	Matrix Duplicate Spike-1901	"
1	1901	"
2	1995	CDF-1
3	1996	CDF-2
4	1997	CDF-3
5	1998	CDF-4
6	1999	CDF-5
7	2000	CDF-6
8	2001	CDF-7
9		
10		

SOIL MATRIX SPIKE RECOVERY DATA

Compounds	Units	MS Conc.	MS recovery %	MSD Conc.	MSD recovery %	RPD	QC Limits Recovery	QC Limits RPD
Total Petroleum Hydrocarbons	mg/Kg	90.8	90	92.1	92	1	83 - 100	8

RPD : 0 out of 1 outside limits
Spike Recovery : 0 out of 2 outside limits

CDF001543

GEO Analytical, Inc.

Quality Control Report
Total Petroleum Hydrocarbons in Soil by EPA Method 418.1

Client ID: Parsons Engineering Science **Client Project :** Canton Drop Forge 731397.01000

Lab Project Number : 9704102 **Date Analyzed :** 04/25-28/97

SOILBLANK SUMMARY

Compounds Identified	Amount	Units
Total Petroleum Hydrocarbons	< 4.0	mg/Kg

This soil method blank applies to the following samples, MS and MSD.

SOIL SAMPLE DATA

#	Laboratory Sample Number	Client Sample ID
	Blank	N/A
	Matrix Spike-Lab Soil	"
	Matrix Duplicate Spike-Lab Soil	"
1	2002	CDF-8
2	2003	CDF-9
3	2004	CDF-10
4		
5		
6		
7		
8		
9		
10		

SOIL MATRIX SPIKE RECOVERY DATA

Compounds	Units	MS Conc.	MS recovery %	MSD Conc.	MSD recovery %	RPD	QC Limits Recovery	QC Limits RPD
Total Petroleum Hydrocarbons	mg/Kg	92.8	91	90.5	89	3	83 - 100	8

RPD : 0 out of 1 outside limits
Spike Recovery : 0 out of 2 outside limits

CDF001544

GEO Analytical, Inc.

Quality Control Report
Semi-Volatile Organics in Soil by EPA Method SW846-8270

Client ID : Parsons Engineering Science
Client Project : Canton Drop Forge 731397.01000
Lab Project Number : 9704102
Date Analyzed : 04/30-05/05/97

SOIL BLANK SUMMARY

Compounds Identified	R.T.	Amount	Units
nd			ug/Kg

This soil method blank applies to the following samples, MS and MSD.

SOIL SURROGATE RECOVERY DATA

#	Lab Sample Number	Client Sample ID	2-Fluoro phenol %	Phenol d-5 %	Nitrobenzene d-5 %	2-Fluoro biphenyl %	2,4,6-Tribromo phenol %	4-Terphenyl d-14 %	Total Out
	Blank	N/A	70	67	86	74	83	73	0
	Matrix Spike-2015	"	18*	50*	84	70	1*	74	3*
	Matrix Duplicate Spike-2015	"	24*	69	81	81	0*	79	2*
1	2015	"	28*	62	88	75	1*	79	2*
2	1995	CDF-1	91	76	100	99	92	82	0
3	1996	CDF-2	92	82	102	68	94	94	0
4	1997	CDF-3	88	78	93	74	101	80	0
5	1998	CDF-4	82	72	86	95	92	79	0
6	1999	CDF-5	80	71	91	101	94	84	0
7	2000	CDF-6	86	76	84	98	88	89	0
8	2001	CDF-7	92	64	75*	73	87	100	1*
9	2002	CDF-8	75	59*	71*	101	85	92	2*
10	2003	CDF-9	80	60*	78*	92	71	94	2*
		QC Limits	33-144	62-120	80-132	67-105	24-135	49-141	

SOIL MATRIX SPIKE RECOVERY DATA

Compounds	Units	MS Conc.	MS recovery %	MSD Conc.	MSD recovery %	RPD	QC Limits Recovery	QC Limits RPD
Phenol	mg/Kg	2.46	49	3.33	67	30	47-114	33
2-Chlorophenol	mg/Kg	1.04	21**	1.16	23**	11	49-115	24
1,4-Dichlorobenzene	mg/Kg	2.14	64	2.50	75	15	29-133	26
N-Nitroso-di-n-propylamine	mg/Kg	2.25	68	2.68	80	17	48-129	23
1,2,4-Trichlorobenzene	mg/Kg	2.41	72	2.58	77	7	44-121	23
4-Chloro-3-methylphenol	mg/Kg	2.85	57	3.12	62	9	39-132	23
Acenaphthene	mg/Kg	2.33	70	2.68	80	14	56-125	19
4-Nitrophenol	mg/Kg	0	0**	0	0**	0	D-113	39
2,4-Dinitrotoluene	mg/Kg	2.26	68	2.40	72	6	46-114	21
Pentachlorophenol	mg/Kg	0	0**	0	0**	0	5-142	17
Pyrene	mg/Kg	2.59	78	2.56	77	1	50-140	24

RPD : 0 out of 11 outside limits
Spike Recovery : 6** out of 22 outside limits

**Note: The laboratory control sample(LCS) run for the parameters above was within established limits. The method was in control; however, the matrix spike data for the QC sample above was outside of the acceptable limits for 2-Chlorophenol, 4-Nitrophenol and Pentachlorophenol. The data associated with that specific sample was flagged as an "estimated concentration" for those compounds due to a sample matrix effect.

*Note: The low surrogate recoveries were due to a sample matrix effect. The samples were re-prepped and re-run and yielded similar low recoveries. The analysis is in control.

CDF001545

GEO Analytical, Inc.

Quality Control Report
Semi-Volatile Organics in Soil by EPA Method SW846-8270
Page 2. - Laboratory Control Sample Information

Client ID :	**Parsons Engineering Science**	**Client Project :**	**Canton Drop Forge 731397.01000**
Lab Project Number :	**9704102**	**Date Analyzed :**	**04/30-05/05/97**

LABORATORY CONTROL SAMPLE RECOVERY DATA

Compounds	Units	LCS Measured Conc.	LCS Recovery %	LCS Recovery Limits
Phenol	mg/Kg	3.53	71	47-114
2-Chlorophenol	mg/Kg	3.37	67	49-115
1,4-Dichlorobenzene	mg/Kg	2.33	70	29-133
N-Nitroso-di-n-propylamine	mg/Kg	2.42	73	48-129
1,2,4-Trichlorobenzene	mg/Kg	2.44	73	44-121
4-Chloro-3-methylphenol	mg/Kg	3.90	78	39-132
Acenaphthene	mg/Kg	2.29	69	56-125
4-Nitrophenol	mg/Kg	2.64	53	0-113
2,4-Dinitrotoluene	mg/Kg	2.37	71	46-114
Pentachlorophenol	mg/Kg	3.37	67	5-142
Pyrene	mg/Kg	2.96	89	50-140

LCS Spike Recovery : 0 out of 11 outside limits

CDF001546

GEO Analytical, Inc.

Quality Control Report
Semi-Volatile Organics in Soil by EPA Method SW846-8270

Client ID : Parsons Engineering Science
Client Project : Canton Drop Forge 731397.01000
Lab Project Number : 9704102
Date Analyzed : 04/30-05/05/97

SOIL BLANK SUMMARY

Compounds Identified	R.T.	Amount	Units
nd			ug/Kg

This soil method blank applies to the following samples, MS and MSD.

SOIL SURROGATE RECOVERY DATA

#	Lab Sample Number	Client Sample ID	2-Fluoro phenol %	Phenol d-5 %	Nitrobenzene d-5 %	2-Fluoro biphenyl %	2,4,6-Tribromo phenol %	4-Terphenyl d-14 %	Total Out
	Blank	N/A	70	67	86	74	83	73	0
	Matrix Spike-2015	"	18*	50*	84	70	1*	74	3*
	Matrix Duplicate Spike-2015	"	24*	69	81	81	0*	79	2*
1	2015	"	28*	62	88	75	1*	79	2*
2	2004	CDF-10	88	76	90	98	98	81	0
3									
4									
5									
6									
7									
8									
9									
10									
		QC Limits	33-144	62-120	80-132	67-105	24-135	49-141	

CDF001547

SOIL MATRIX SPIKE RECOVERY DATA

Compounds	Units	MS Conc.	MS recovery %	MSD Conc.	MSD recovery %	RPD	QC Limits Recovery	QC Limits RPD
Phenol	mg/Kg	2.46	49	3.33	67	30	47-114	33
2-Chlorophenol	mg/Kg	1.04	21**	1.16	23**	11	49-115	24
1,4-Dichlorobenzene	mg/Kg	2.14	64	2.50	75	15	29-133	26
N-Nitroso-di-n-propylamine	mg/Kg	2.25	68	2.68	80	17	48-129	23
1,2,4-Trichlorobenzene	mg/Kg	2.41	72	2.58	77	7	44-121	23
4-Chloro-3-methylphenol	mg/Kg	2.85	57	3.12	62	9	39-132	23
Acenaphthene	mg/Kg	2.33	70	2.68	80	14	56-125	19
4-Nitrophenol	mg/Kg	0	0**	0	0**	0	D-113	39
2,4-Dinitrotoluene	mg/Kg	2.26	68	2.40	72	6	46-114	21
Pentachlorophenol	mg/Kg	0	0**	0	0**	0	5-142	17
Pyrene	mg/Kg	2.59	78	2.56	77	1	50-140	24

RPD : 0 out of 11 outside limits
Spike Recovery : 6** out of 22 outside limits

**Note: The laboratory control sample(LCS) run for the parameters above was within established limits. The method was in control; however, the matrix spike data for the QC sample above was outside of the acceptable limits for 2-Chlorophenol, 4-Nitrophenol and Pentachlorophenol. The data associated with that specific sample was flagged as an "estimated concentration" for those compounds due to a sample matrix effect.

*Note: The low surrogate recoveries were due to a sample matrix effect. The samples were re-prepped and re-run and yielded similar low recoveries. The analysis is in control.

GEO Analytical, Inc.

Quality Control Report
Semi-Volatile Organics in Soil by EPA Method SW846-8270
Page 2. - Laboratory Control Sample Information

Client ID : Parsons Engineering Science
Client Project : Canton Drop Forge 731397.01000
Lab Project Number : 9704102
Date Analyzed : 04/30-05/05/97

LABORATORY CONTROL SAMPLE RECOVERY DATA

Compounds	Units	LCS Measured Conc.	LCS Recovery %	LCS Recovery Limits
Phenol	mg/Kg	3.53	71	47-114
2-Chlorophenol	mg/Kg	3.37	67	49-115
1,4-Dichlorobenzene	mg/Kg	2.33	70	29-133
N-Nitroso-di-n-propylamine	mg/Kg	2.42	73	48-129
1,2,4-Trichlorobenzene	mg/Kg	2.44	73	44-121
4-Chloro-3-methylphenol	mg/Kg	3.90	78	39-132
Acenaphthene	mg/Kg	2.29	69	56-125
4-Nitrophenol	mg/Kg	2.64	53	0-113
2,4-Dinitrotoluene	mg/Kg	2.37	71	46-114
Pentachlorophenol	mg/Kg	3.37	67	5-142
Pyrene	mg/Kg	2.96	89	50-140

LCS Spike Recovery : 0 out of 11 outside limits

CDF001548

GEO Analytical, Inc.

Quality Control Report
Semi-Volatile Organics in Water by Method SW846-8270

Client ID: Parsons Engineering Science **Client Project :** Canton Drop Forge 731397.01000

Lab Project Number : 9704102 **Date Analyzed :** 04/23/97

WATER BLANK SUMMARY

Compounds Identified	R.T.	Amount	Units
nd			ug/L

This water method blank applies to the following samples, MS and MSD.

WATER SURROGATE RECOVERY DATA

#	Lab Sample Number	Client Sample ID	2-Fluoro phenol %	Phenol d-5 %	Nitrobenzene d-5 %	2-Fluoro biphenyl %	2,4,6-Tribromo phenol %	4-Terphenyl d-14 %	Total Out
	Blank	N/A	42	22	67	60	92	78	0
	Matrix Spike-Lab Water	"	45	26	76	81	91	94	0
	Matrix Dup Spike-Lab Water	"	48	28	85	78	90	101	0
1	2005	Trip Blank	50	27	68	72	86	72	0
2									
3									
4									
5									
6									
		QC Limits	35-110	10-110	35-114	43-116	10-123	33-141	

WATER MATRIX SPIKE RECOVERY DATA

Compounds	Units	MS Conc.	MS recovery %	MSD Conc.	MSD recovery %	RPD	QC Limits Recovery	QC Limits RPD
Phenol	ug/L	4.52	30	4.89	33	8	5 - 69	52
2-Chlorophenol	ug/L	9.71	65	10.0	67	3	26 - 112	62
1,4-Dichlorobenzene	ug/L	5.77	58	6.52	65	12	21 - 86	36
N-Nitroso-di-n-propylamine	ug/L	5.84	58	6.18	62	6	23 - 121	38
1,2,4-Trichlorobenzene	ug/L	6.29	63	8.11	81	25	23 - 86	38
4-Chloro-3-methylphenol	ug/L	12.7	85	13.3	88	4	30 - 120	31
Acenaphthene	ug/L	8.07	81	7.92	79	2	41 - 106	32
4-Nitrophenol	ug/L	4.33	29	4.20	28	3	10 - 80	50
2,4-Dinitrotoluene	ug/L	8.44	84	8.34	83	1	30 - 121	41
Pentachlorophenol	ug/L	12.3	82	11.1	74	10	32 - 129	27
Pyrene	ug/L	8.37	84	9.26	93	10	50 - 129	37

RPD : 0 out of 11 outside limits
Spike Recovery : 0 out of 22 outside limits

CDF001549

GEO Analytical, Inc.

9263 Ravenna Rd. Suite A-7
Twinsburg, OH 44087
Phone Number 216 963 6990
Fax Number 216 963 6975

CHAIN OF CUSTODY RECORD 9704102

COMPANY NAME AND ADDRESS: PARSONS ES, 19101 VILLAVIEW RD, CLEVE. OH 44119

PROJECT NUMBER AND DESCRIPTION: 731397.01000 Canton Drop Forge VAP

SAMPLER SIGNATURES: Allan Resnick

STA.#	DATE	TIME	COMP.	GRAB.	STATION LOCATION	NO. OF CONTAINERS	Analysis Requested: 8015A CL-C16	8015C16	418.1	SVOCS 8270B				NOTES
CDF-1	4.18.97			✓		1	X	X	X	X	1995			
CDF-2	"			✓		1	X	X	X	X	1996			
CDF-3	"			✓		1	X	X	X	X	1997			
CDF-4	"			✓		1	X	X	X	X	1998			
CDF-5	"			✓		1	X	X	X	X	1999			
CDF-6	"			✓		1	X	X	X	X	2000			
CDF-7	"			✓		1	X	X	X	X	2001			
CDF-8	"			✓		1	X	X	X	X	2002			
CDF-9	"			✓		1	X	X	X	X	2003			
CDF-10	"			✓		1	X	X	X	X	2004			
					TRIP BLANK	1				X	2005			ADD TRIP BLANK TO THIS COC PER FAX FROM ALLEN ROSNICK 4/22/97 10:43 AM CDT.

CHAIN OF CUSTODY SIGNATURES (Name, Company, Date, Time)

1. Relinquished By: Allan Resnick Parsons 4.22.97 8:00 a.m.
   Received By: _____
2. Relinquished By: _____
   Received By: _____
3. Relinquished By: _____
   Received By: _____
4. Submitted to Laboratory By: Allan Resnick
   Received for Laboratory By: Amy Arnett 4.22.97 8:00 am

CDF001550

APPENDIX B:

RESULTS OF GEOTECHNICAL ANALYSES AND STABILITY TESTING FROM APPLIED CONSTRUCTION TECHNOLOGIES, INC.

FOR

CANTON DROP FORGE, INC.
CANTON, OHIO

MAY 1997

ENGINEERING • TESTING • INSPECTION

APPLIED CONSTRUCTION TECHNOLOGIES, INC.

210 HAYES DRIVE • SUITE C • CLEVELAND, OHIO 44131 • (216) 459-TEST • FAX (216) 459-8954
478 E. EXCHANGE ST. • SUITE 202 • AKRON, OHIO 44304 • (216) 253-TEST • FAX (216) 253-3462

May 12, 1997

Parsons Engineering Science, Inc.
19101 Villaview Road, Suite 301
Cleveland, Ohio 44119

Attention: Mr. Rick Volpi

SUBJECT: LABORATORY TEST RESULTS
OILY CLAYEY GRAVEL AND SAND FROM
CANTON DROP FORGE

ACT PROJECT NO. 9705.08

Enclosed are the laboratory test results which have been completed on the sample of black oily clayey gravel and sand which was submitted to us on April 18, 1997. Reportedly the material is from Canton Drop Forge and the material is to be placed within a clay lined and capped cell for biological treatment.

It is our understanding that in its present condition the material is very difficult to work with and is not expected to be stable enough to construct a compacted clay cap over it. To improve its stability, we mixed various mixtures of lime and fly ash into the oily waste material. The granular nature of the material made it unsuitable for compression testing; therefore, the stability of the oily waste and the various mixtures of lime, fly ash, and waste were determined by conducting California Bearing Ratio tests (ASTM D1883). The test results are summarized below:

	Compacted Density	CBR
Oily Waste without Lime and Fly Ash	127.8 pcf	2.7
Oily Waste with 2 % Lime and 10% Fly Ash	120.9 pcf	10.4
Oily Waste with 6 % Lime and 22.5 % Fly Ash	115.5 pcf	10.0
Oily Waste with 10 % Lime and 35 % Fly Ash	108.4 pcf	9.3

The test results indicate that the stability of the material can be greatly improved with the addition of minor amounts of lime and fly ash. The stability of the mixture did not improve when larger amounts of lime and fly ash were used.

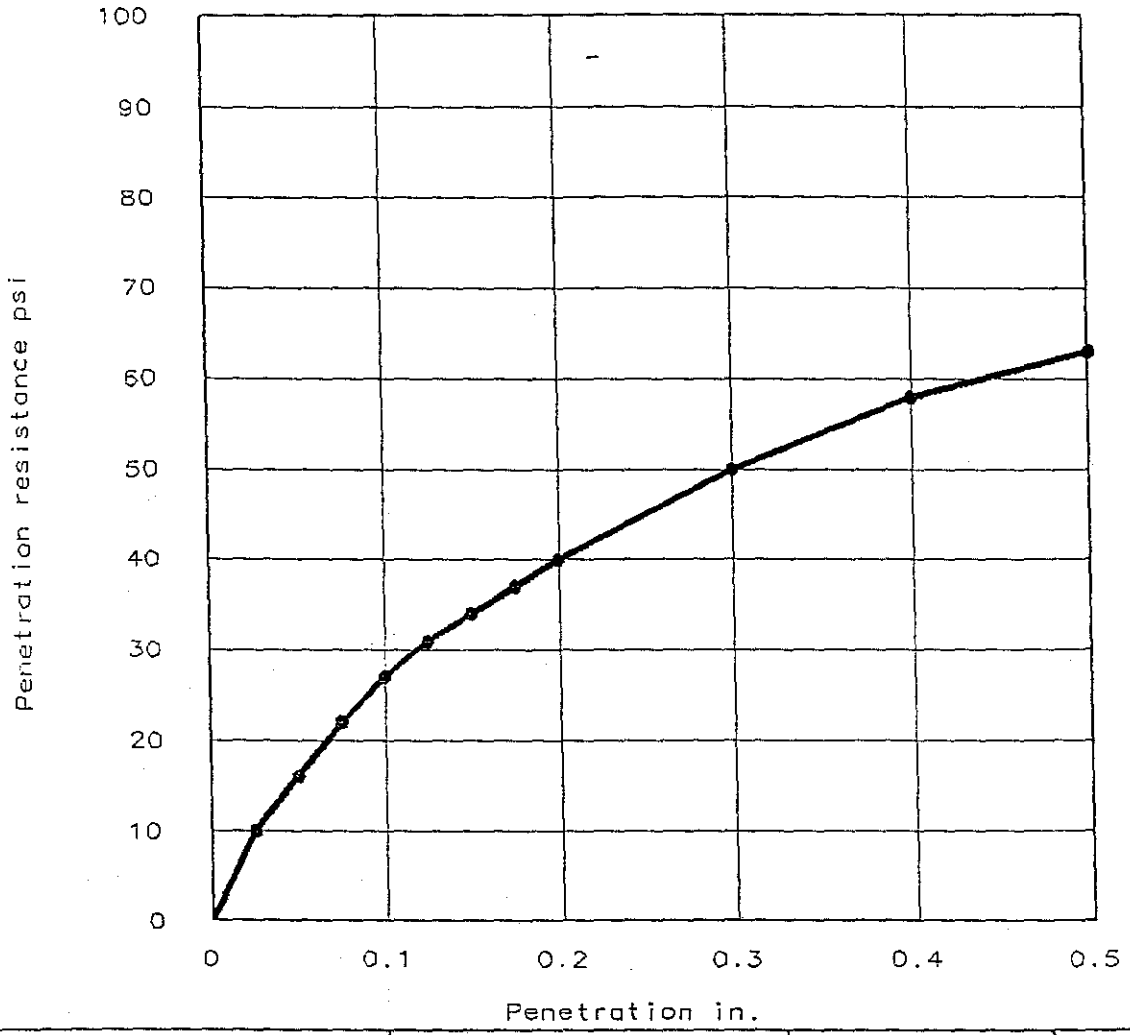
Based on the test results, a properly blended mixture of the oily waste with 2 % lime and 10 % fly ash would be expected to compact readily and be stable under normal construction equipment.

Should you have any questions concerning these test results, please do not hesitate to contact us.

APPLIED CONSTRUCTION TECHNOLOGIES, INC.
by:

Lynton L. Price, P.E.
Director of Engineering

BEARING RATIO TEST REPORT



	Molded			Soaked			CBR (%)		Penet.	Swell
	Dens.	% max	moist	Dens.	% max	moist	0.1"	0.2"	Surcharge	%
1 ●	127.8		3.5%	128.1		4.7%	2.7	2.7	14.93 lbs.	0.0
2 ▲										
3 ■										

MATERIAL DESCRIPTION	USCS	Max. dens.	Opt. w.c.	LL	PI
OILY, CLAYEY GRAVEL & SAND					

Project No: 9705.08
Project: CANTON DROP FORGE
Location: BIOCELL
CLIENT: PARSONS ENGINEERING SCIENCE,INC.
Date: 5/6/97

Test Descr./Remarks:

BULK SAMPLE
SUBMITTED TO US BY
PARSONS ENGINEERING
SCIENCE ON 4-18-97

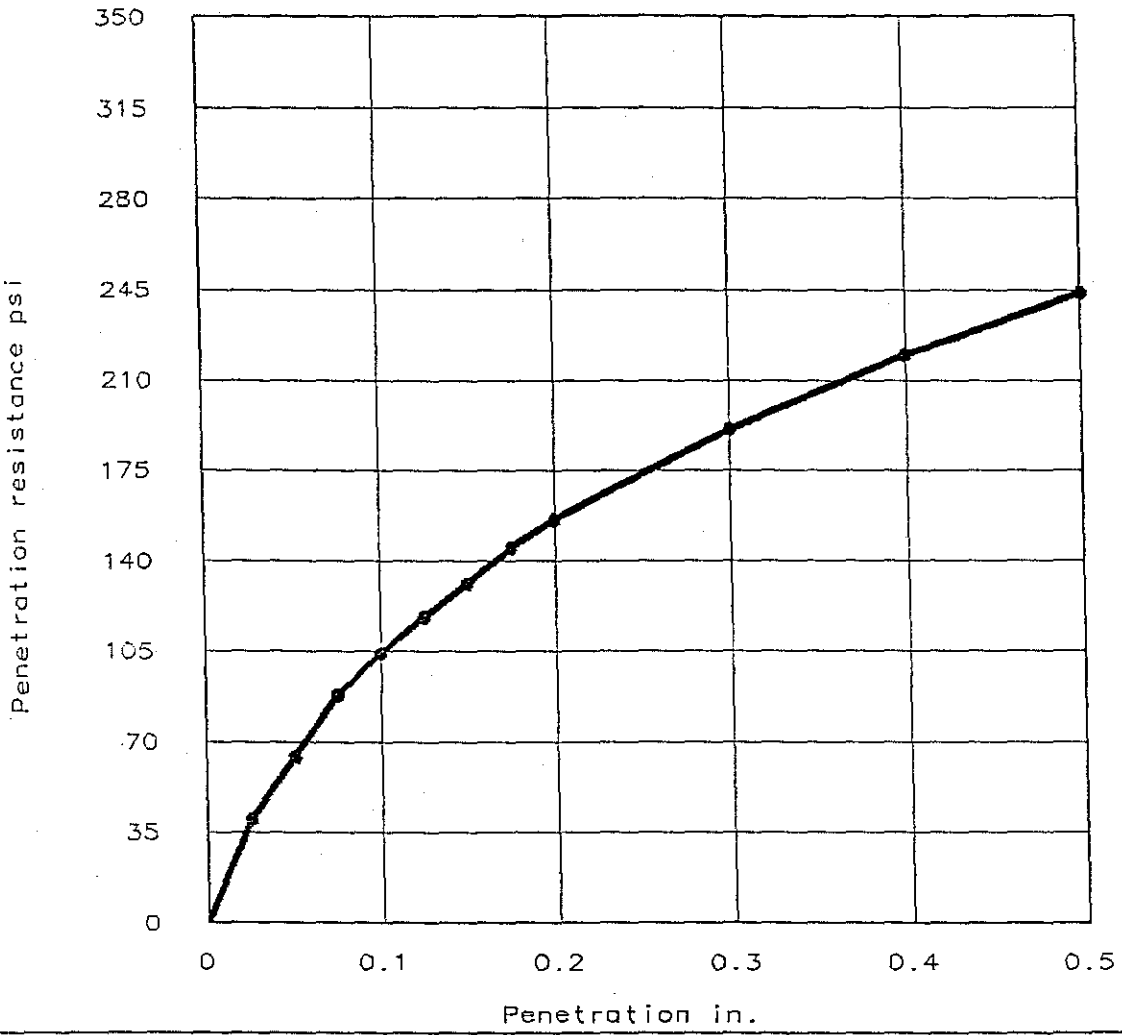
BEARING RATIO TEST REPORT

APPLIED CONSTRUCTION TECHNOLOGIES, I

Fig. No.

CDF001554

BEARING RATIO TEST REPORT



	Molded			Soaked			CBR (%)		Penet.	Swell
	Dens.	% max	moist	Dens.	% max	moist	0.1"	0.2"	Surcharge	%
1 ●	120.9		5.4%	120.9		7.6%	10.4	10.4	15.07 lbs.	0.4
2 ▲										
3 ■										

MATERIAL DESCRIPTION	USCS	Max. dens.	Opt. w.c.	LL	PI
OILY,CLAYEY GRAVEL&SAND,WTH 10%FLYASH,2%LIME					

Project No: 9705.08
Project: CANTON DROP FORGE
Location: BIOCELL
CLIENT: PARSONS ENGINEERING SCIENCE,INC.
Date: 5-9-97

BEARING RATIO TEST REPORT

APPLIED CONSTRUCTION TECHNOLOGIES, INC.

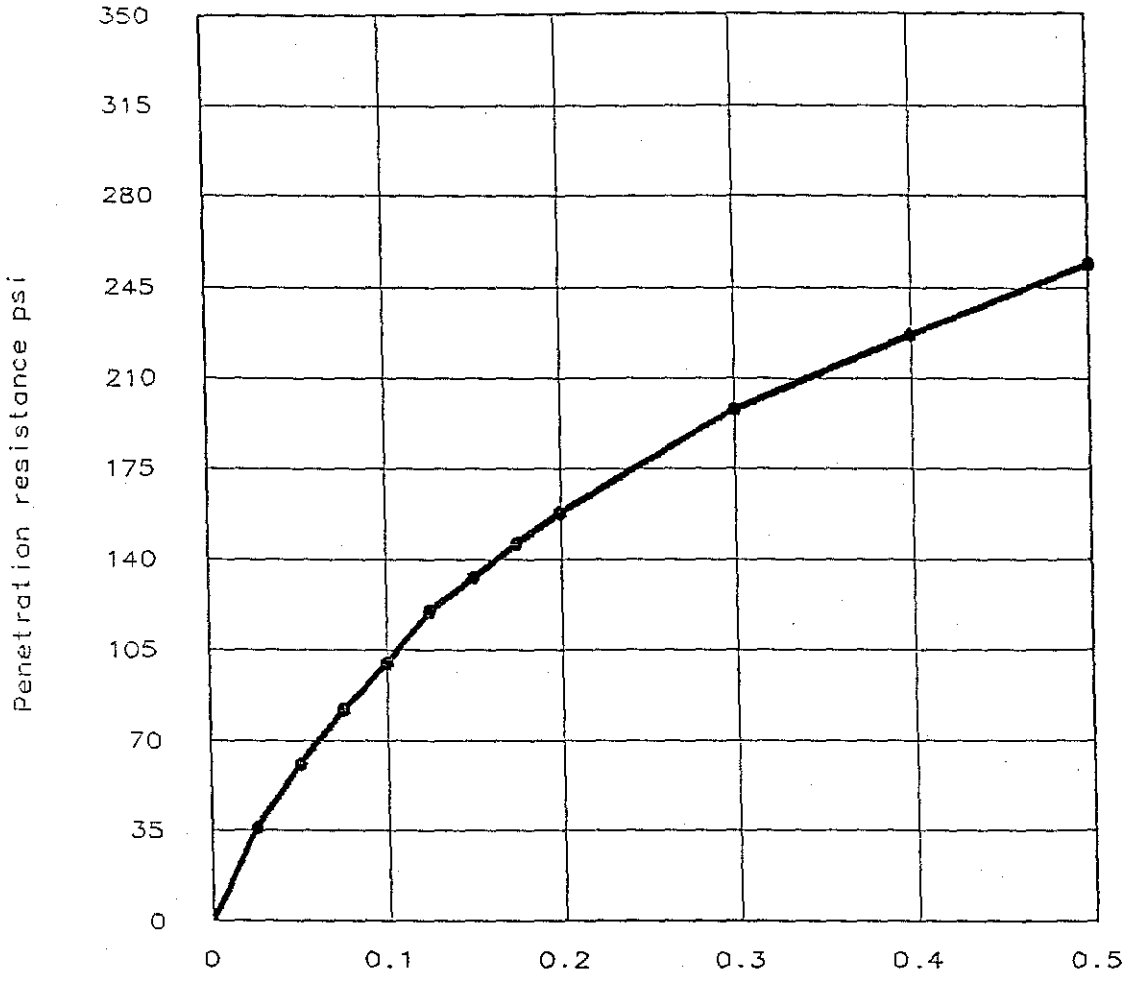
Test Descr./Remarks:
ASTM-D 1883

BULK SAMPLE
SUBMITTED TO US BY
PARSONS ENGINEERING
SCIENCE ON 4-18-97

Fig. No.

CDF001555

BEARING RATIO TEST REPORT



	Molded			Soaked			CBR (%)		Penet.	Swell
	Dens.	% max	moist	Dens.	% max	moist	0.1"	0.2"	Surcharge	%
1 ●	115.5		3.2%	114.5		10.1%	10.0	10.5	15.01 lbs.	0.9
2 ▲										
3 ■										

MATERIAL DESCRIPTION	USCS	Max. dens.	Opt. w.c.	LL	PI
OILY,CLAYEY GRAVEL&SAND,WTH22.5%FLYASH6%LIME					

Project No: 9705.08
Project: CANTON DROP FORGE
Location: BIOCELL
CLIENT: PARSONS ENGINEERING SCIENCE,INC.
Date: 5-9-97

BEARING RATIO TEST REPORT

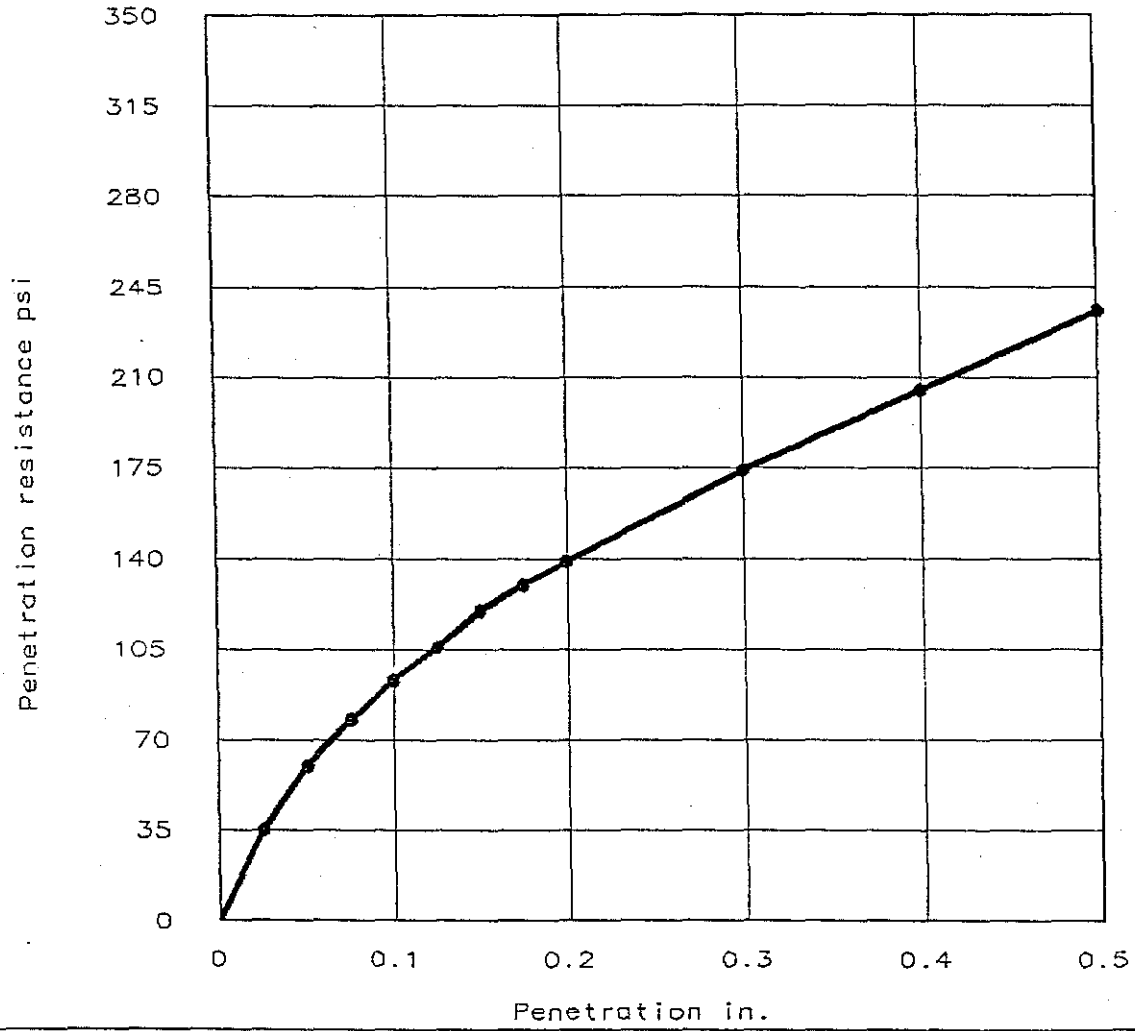
APPLIED CONSTRUCTION TECHNOLOGIES, INC.

Test Descr./Remarks:
ASTM-D 1883

BULK SAMPLE
SUBMITTED BY PARSONS
ENGINEERING SCIENCE
ON 4-18-97

Fig. No.

BEARING RATIO TEST REPORT



	Molded			Soaked			CBR (%)		Penet.	Swell
	Dens.	% max	moist	Dens.	% max	moist	0.1"	0.2"	Surcharge	%
1 ●	108.4		4.1%	107.5		14.1%	9.3	9.3	15.07 lbs.	0.9
2 ▲										
3 ■										

MATERIAL DESCRIPTION	USCS	Max. dens.	Opt. w.c.	LL	PI
OILY,CLAYEY GRAVEL&SAND WTH 35%FLYASH10%LIME					

Project No: 9705.08
Project: CANTON DROP FORGE
Location: BIOCELL
CLIENT: PARSONS ENGINEERING SCIENCE,INC.
Date: 5-9-97

BEARING RATIO TEST REPORT

APPLIED CONSTRUCTION TECHNOLOGIES, INC.

Test Descr./Remarks:
ASTM-D 1883

BULK SAMPLE
SUBMITTED BY PARSONS
ENGINEERING SCIENCE
ON 4-18-97

Fig. No.

CDF001557

APPENDIX C:

CRITERIA FOR SCREENING ALTERNATIVES FOR CANTON DROP FORGE, INC. LAGOON #1 RE-CONSTRUCTION PROJECT

CRITERIA FOR SCREENING ALTERNATIVES FOR CANTON DROP FORGE, INC. LAGOON #1 RE-CONSTRUCTION PROJECT

Described below are the criteria used for screening the six (6) alternatives considered for the CDF Lagoon #1 re-construction project and their applications in evaluating these options.

Economic Impact

This criterion considers budget-level unit costs of implementing the six alternatives. These analyses take into account the total costs for addressing the Lagoon #1 re-construction and disposal of biocell material, divided by the estimated volume of the biocell, including the additional material to be removed from Lagoon #1, (i.e., about 5,500 tons). The calculation also takes into account any credits which may be realized for re-use of the biocell material.

Rating structure
1 is > $60 / ton
2 is $45 to $60 / ton
3 is $35 to $45 / ton
4 is $20 to $35 / ton
5 is < $20 / ton

In Option a, costs to test, load, transport, dump (including excise taxes) the biocell material are projected at about $21/ton. Additional expenses are required to reconstruct Lagoon #1, estimated at about $23/ton. (**Note**: This estimate will also be used for Lagoon #1 re-construction in Options b, c, d and e).

In Options d and e, costs to test, screen, fluidize (optional only), load, transport and transfer the material are partial offset by the value the receiving facility placed on it. About $40/ton in total costs (including those for Lagoon #1) are partial offset by credits of about $5/ton for recovered hydrocarbon value in Option d and about $15/ton for displaced raw materials needed in Option e.

Please refer to Table 4 for costs estimated for Option f (about $35/ton).

Schedule Impact

This criterion considers the total time, commencing from CDF's authorization, to complete engineering, procurement, permitting (or other third-party approvals), implementation and closure of the alternatives.

Rating structure
1 is > 8 months
2 is 6 to 8 months
3 is 4 to 6 months
4 is 2 to 4 months
5 is <2 months

It is envisaged that, since Options b, c and f are largely within CDF's control, these actions can be completed within 2 to 4 months. For Option a, significant delays are not anticipated acquiring landfill approval for disposal of this (previously characterized) non-hazardous material. Hence, Option a should be completed within 2 months. Options d and e are anticipated to require longer periods of time to test, verify quality, get third-party approvals (i.e., from Ashland or asphalt plant) and to fit within their operating schedules. To avoid subsequent re-handling of the material, direct feed to their processes will be required, causing potential delays in project completion.

Technical Feasibility

Technical feasibility takes into account the implementability of the proposed options. The rating is entirely subjective with factors identified regarding the ease or difficulty anticipated.

Rating structure
1 is very difficult to implement
2 is somewhat difficult to implement
3 has neutral difficulty for implementation
4 is reasonably easy to implement
5 is most easily implemented

It is anticipated that Options a, b and f will be reasonably easy to implement. Although there are small risks of failure, these approaches have been completed many times without significant problems. Options c and e have also been attempted before, but the risks of failure (from experience) are higher. For Option c, long-term degradation of the stabilized material may produce undesired results (i.e., leaching and/or structural failure), due to exposure to traffic and the elements. For Option e, difficulty in maintaining stability of the subject material has not been tested and, hence, is uncertain. Option d poses the greatest risks of potential failure, primarily due to the variability in hydrocarbon content, texture, sizing, etc., of the material and the degree of pre-processing which will be required to ensure its satisfactory use in this application. Further consideration of Option d is probably unwarranted.

Stakeholder Acceptance

In this criterion, we attempt to evaluate the acceptability of each option to the myriad of parties which (may) have an interest in this project. The assumed stakeholders are: CDF; regulatory agencies, including Ohio EPA and USEPA; potential customers, including Ashland or the asphalt plant; and neighboring property owners.

Rating structure
1 anticipates potentially insurmountable objectives
2 anticipates some objection
3 is neutral with regards to acceptance
4 is generally acceptable
5 projects complete acceptance

Most of the options (a, b, d and e) are perceived to be neutral with respect to acceptability; there are no known issues or concerns which could prohibit their application. Option c is perceived as potentially less acceptable since the stabilized material will be placed in areas subject to traffic and scrutiny (see also the concern regarding long-term stability). Option f is perceived as the most acceptable in that it permits CDF to address two issues simultaneously (i.e., with one set of actions), does not involve external scrutiny and leaves no biocell material exposed to traffic, the elements or scrutiny.

Permitting Requirements

This assessment addresses the probable need for permits or third-party approvals.

Rating structure
1 anticipates substantial/very difficult requirements
2 anticipates somewhat difficult requirements
3 anticipates moderate requirements
4 anticipates minor requirements
5 anticipates no permitting required

For Options, c and f, no external approvals or permit requirements are anticipated. For Options a, d and e, third-party approvals are required from the receiving facilities. Also, for Option b, in that a public right-of-way must be crossed, transporting the stabilized biocell material may result in public scrutiny and require manifesting.

APPENDIX D:

ALTERNATIVES APPROACHES FOR LAGOON #1 DRAINAGE FACILITIES FOR CANTON DROP FORGE, INC. LAGOON #1 RE-CONSTRUCTION PROJECT

PARSONS ENGINEERING SCIENCE, INC.

19101 Villaview Road, Suite 301
Cleveland, Ohio 44119
(216) 486-9005
(216) 486-6119 (facsimile)

FACSIMILE MESSAGE

TO:	Mr. Keith Houseknecht
LOCATION:	CANTON DROP FORGE, INC.
FAX NO.:	(330) 477-2046
FROM:	Ed Karkalik & Gordon Melle
DATE:	4 June 1997
NO. OF PAGES:	3

Dear Keith:

Based on our facsimile of 30 May 1997 and our telephone discussions since then, Parsons Engineering Science, Inc. (Parsons ES) has re-considered the cost estimates for the three options discussed previously. In the most recent activity, we have focused on cost savings ideas for the gravity discharge system from Lagoon #1 to Lagoon #2 (Option A); a pressure main discharge system from Lagoon #1 to the existing gravity sewer in/near Building A (Option B); and a pressure main system from Lagoon #1 to Lagoon #2. As before, in all three options, we have also included removal and disposal of the existing pump stand, installation of a new 8-inch line for the appropriate sections of the west side storm sewer and a new pump installation (for Options B and C only). Additional cost savings ideas proposed are included in a description of each option, as follows:

OPTION A: New Gravity Discharge from Lagoon #1 to Lagoon #2

Description of Cost Savings Approach: use a 6" (instead of 8") diameter line between Lagoons #1 and #2; install a new 8" diameter line along the western boundary for only 200 ft, leaving the line submerged for at least part of the time. In this approach, the water level can vary from elev. 1064 to about elev. 1069, depending on the level of Lagoon #1 at the start of the projected 25-year storm. Because this approach requires about 2 days to discharge the water to Lagoon #2, there is a risk that another significant rainfall will occur, creating an overflow situation. Note: in this option, $93,330 of the cost estimated are related to excavation and back-filling; changing line size does not affect this portion of the cost.

Re-align 8" storm sewer along west side of Upsetter Bldg (200 ft)	$11,200
Install new 6" gravity discharge line between Lagoons #1 & #2 (1200 ft)	115,740
Remove and dispose existing pump stand	3,000
Engineering design and construction inspection	13,000
TOTAL	**$142,940**

OPTION B: New Pressure Main from Lagoon #1 to Existing Gravity Sewer

Description of Cost Savings Approach: use existing 4" diameter line from separator discharge to gravity sewer; tie-in new 4" diameter line from Lagoon #1 pump discharge to separator discharge, including installation of check valves to prevent back-flow; use 3 HP pump. In this approach, two days will also be required to discharge the contents of Lagoon #1, allowing the level to rise to between elev. 1063 and 1068. There still is a probability (albeit of slightly lower risk) of overflowing Lagoon #1. More significantly, it is unlikely that both the Lagoon #1 and separator discharge can be operated concurrently. Increased operating surveillance would be required to ensure that either system was not jeopardized and that both are not operating simultaneously; otherwise, there is a risk that Lagoon #1 water could enter the separator or vice versa. Note: About $17,900 of this estimate is for excavating and back-filling the trenches required to install the proposed lines.

Re-align 8" storm sewer along west side of Upsetter Bldg (200 ft)	$11,200
Install new 4" pressure main from Lagoon #1 to separator discharge (250 ft)	13,000
Install new 3 HP pump and motor unit, foundation, electrical & appurtenances	9,000
Remove and dispose existing pump stand	3,000
Engineering design and construction inspection	4,000
TOTAL	**$40,200**

OPTION C: New Pressure Main from Lagoon #1 to Lagoon #2

Description of Cost Saving Approach: use a 4" diameter line from Lagoon #1 to #2; use a 3 HP pump. The primary concerns with this approach are that, while water levels will rise between elev. 1063 to elev. 1070, depending on the water level prior to the event, it will take 3 days to discharge the Lagoon's contents to pre-storm levels. As a result, there is a more significant risk that an overflow situation may occur at Lagoon #1. Note: About $49,600 of this estimate are required for excavation and back-filling activities.

Re-align 8" storm sewer along west side of Upsetter Bldg (200 ft)	$11,200
Install new 4" pressure main from Lagoon #1 to Lagoon #2 (1200 ft)	51,760
Install 3 HP new pump, foundation, electrical & appurtenances	9,000
Remove and dispose existing pump stand	3,000
Engineering design and construction inspection	7,500
TOTAL	**$82,460**

The following assumptions were used and/or apply to the above estimates:

- no hazardous waste disposal of the excavated soils and importation of clean fill will be required;
- underground utilities are limited to those identified by Keith Houseknecht in our telephone conversation on 29 May 1997;
- pavement replacement will be limited to that identified by Keith Houseknecht;
- pavement removed for installation of the gravity sewer will be disposed off-site;

PARSONS ENGINEERING SCIENCE, INC.

19101 Villaview Road, Suite 301
Cleveland, Ohio 44119
(216) 486-9005
(216) 486-6119 (facsimile)

FACSIMILE MESSAGE

TO:	Mr. Keith Houseknecht
LOCATION:	CANTON DROP FORGE, INC.
FAX NO.:	(330) 477-2046
FROM:	Ed Karkalik & Gordon Melle
DATE:	30 May 1997
NO. OF PAGES:	2

Dear Keith:

In follow-up to our telephone conversation on Thursday, 29 May 1997, Parsons Engineering Science, Inc. (Parsons ES) has re-analyzed the cost estimates for the three options discussed in our facsimiles of 29 May 1997. In particular, we have continued to focus our attention on a gravity discharge system from Lagoon #1 to Lagoon #2 (Option A); a pressure main discharge system from Lagoon #1 to the existing gravity sewer in/near Building A (Option B); and a pressure main system from Lagoon #1 to Lagoon #2. In all three options, we have also included removal and disposal of the existing pump stand, installation of a new 8-inch line for the appropriate sections of the west side storm sewer and a new pump installation (for Options B and C only). Cost estimates are as follows:

OPTION A: New Gravity Discharge from Lagoon #1 to Lagoon #2

Re-align 8" storm sewer along west side of Upsetter Bldg (380 ft)	$22,060
Install new 8" gravity discharge line between Lagoons #1 & #2 (1200 ft)	121,340
Remove and dispose existing pump stand	3,000
Engineering design and construction inspection	15,000
TOTAL	**$161,400**

OPTION B: New Pressure Main from Lagoon #1 to Existing Gravity Sewer

Re-align 8" storm sewer along west side of Upsetter Bldg (200 ft)	$11,200
Install new 6" pressure main from Lagoon #1 to gravity sewer (500 ft)	27,140
Install new pump, foundation, electrical & appurtenances	11,000
Remove and dispose existing pump stand	3,000
Engineering design and construction inspection	5,500
TOTAL	**$57,840**

OPTION C: New Pressure Main from Lagoon #1 to Lagoon #2

Re-align 8" storm sewer along west side of Upsetter Bldg (200 ft)	$11,200
Install new 6" pressure main from Lagoon #1 to Lagoon #2 (1200 ft)	56,740
Install new pump, foundation, electrical & appurtenances	11,000
Remove and dispose existing pump stand	3,000
Engineering design and construction inspection	9,000
TOTAL	**$90,940**

The following assumptions were used and/or apply to the above estimates:

1. no hazardous waste disposal of the excavated soils and importation of clean fill will be required;
2. underground utilities are limited to those identified by Keith Houseknecht in our telephone conversation on 29 May 1997;
3. pavement replacement will be limited to that identified by Keith Houseknecht;
4. pavement removed for installation of the gravity sewer will be disposed off-site;
5. line sizes used are those required to prevent upset conditions, as identified in computer modeling (see memorandum from Ms. Elizabeth McCartney of 29 May 1997).; and
6. overall range of estimates is +/- 20%.

Mr. Gordon Melle and I will be prepared and available to discuss these estimates, their bases and possible permutations with you during the first half of next week (week of 2 June 1997). Please advise of your intentions and/or requirements. We look forward to continuing our support to you and Canton Drop Forge in this and any other environmental requirements which you may encounter.

Sincerely

Ed Karkalik

PARSONS ENGINEERING SCIENCE, INC.

19101 Villaview Road, Suite 301
Cleveland, Ohio 44119
(216) 486-9005
(216) 486-6119 (facsimile)

FACSIMILE MESSAGE

TO:	Mr. Keith Houseknecht
LOCATION:	CANTON DROP FORGE, INC.
FAX NO.:	(330) 477-2046
FROM:	Ed Karkalik & Gordon Melle
DATE:	22 May 1997
NO. OF PAGES:	3

Dear Keith:

In follow-up to our telephone conversation on Tuesday, 20 May 1997, and in response to your facsimile from yesterday, 21 May 1997, Parsons Engineering Science, Inc. provides the following information:

Q1. Will Canton Drop Forge, Inc. (CDF) be able to remove any material from re-constructed Lagoon #1, say, by vacuum truck, once a clay liner is placed, without damaging the liner?

A1. There should be no problem removing material from Lagoon #1 after the clay liner has been installed, provided that the liner is properly placed and compacted and that removal is not attempted by an intrusive means (i.e., by digging with a shovel).

Q2. Can the fly ash which CDF has on-site from its power plant operation be used in the stabilization of biocell material?

A2. Generally, the answer is "yes", provided that the fly ash has properties similar to that used in the stabilization treatability test. In particular, determination of the absorptive capacity and the chemical composition of the fly ash is important prior to assuming that the fly ash generated on-site can be re-used in the stabilization process. Specifically, the absorptive capacity is required to determine the correct mixture ratio for stabilizing the biocell material. Also, the chemical composition is important to ensure that no additional compounds, which may render the biocell material less stable or less environmentally acceptable, are not being added (i.e., such that leaching may be promoted).

Q3. It is my understanding that any fly ash from the CDF boiler or other will be tested for properties required for the biocell.

A3. Although not specifically addressed in our cost estimate, it is not believed that this effort will materially impact the magnitude of the overall estimate (i.e., within the +/- 15% range) for the purposes of comparing the options under consideration. Engineering design activities (not yet authorized or undertaken) will result in a specification for the fly ash. Testing of fly ash, generated from CDF's boiler or any other operations, would be completed subsequently, as part of a yet-to-be defined (or estimated) design and construction review effort.

Q4. Do our estimates include the cost to re-establish the outlet pipe from Lagoon #1 for discharging to Lagoon #2?

A4. Our estimates have included only those items specifically identified as line items, as in Table 4. As I indicated in our telephone conversation and since the costs for re-establishing the outlet pipe in Lagoon #1 are not materially relevant for comparison between the options, we did not specifically identify, scope or cost this item in our estimates. However, assuming that the existing line is appropriately placed (with respect to elevation) and is appropriately sized (which was not part of our scope and hence, has not been checked), the costs to re-connect the line should not significantly impact our cost estimates.

Q5. It is my understanding that design, material and installation cost for the drain from Lagoon #1 to Lagoon #2 is included in the cost estimates.

A5. As indicated in our telephone conversation and since the costs for designing and installing the drain from Lagoon #1 to Lagoon #2 are not relevant for comparison between the options, any costs required to re-align or otherwise re-establish this line have not been addressed in our estimates. It was assumed that existing lines could be re-used, as necessary. [Subsequent discussions and analysis of the situation suggest that this assumption will not apply. In fact, a new, yet-to-be sized and designed connection from Lagoon #1 to Lagoon #2 will probably be required. The costs to design and install a new line should be identified as part of a subsequent effort. At this time, Parsons ES can only provide a budgetary estimate (i.e., +/- 30%), based on work previously completed by others, of $120,000 for installation of a new, gravity-fed line between the Lagoons.]

Q6. Is cost to remove and dispose of the old pump standpipe in the cost estimates? Will the pump station be required for the future operation of Lagoon #1?

A6. In that the costs for addressing the pump standpipe (either through removal or re-establishment) are not relevant for comparison between the options, these costs are not included in the cost estimates in Table 4. It is uncertain at this time whether removal is appropriate, especially since neither the cost estimate nor the decision to establish a new drain line between Lagoons #1 and #2 has not been made. Should removal and disposal of

the pump standpipe (and appurtenances) become necessary, we estimate that the costs (within +/- 30% range) will be about $3,000.

Q7. It is my understanding that design, material and installation cost for raising the sewer on the West side of the Upset Building is included in the cost estimates.

A7. In that the costs for raising the sewer in question are not relevant for comparison between the options, these costs have not been determined or included in the estimates provided in Table 4.

Q8. During our telephone conversation on Wednesday, 21 May 1997, you indicated a desire to install skimming equipment and storage facilities near Lagoon #1 to recover any oil which may be discharged there.

A8. First, in that CDF had indicated that the objective of re-establishing Lagoon #1 is for storm water control, we had not anticipated any need for this equipment and, hence, had not estimated the costs for providing same.

Also, CDF should be aware that establishment of a permanent oil recovery system at Lagoon #1 may result in a change in the intended use of this impoundment (from storm water control to process water treatment), potentially making a Voluntary Action Program (VAP) approach inappropriate for consideration.

Q9. In the first full paragraph on page 3 of your report, the third line includes the phase "(of three)"; I believe that we had 2 USTs and that one was removed.

A9. As we discussed, based on one of the drawings received from CDF and information provided by Mr. Rick Zollinger, Esq., we understood that there were three UST areas at CDF, one of which was eliminated. Based on our subsequent telephone conversation, we were both correct. There were three UST areas at CDF: one area with a gasoline UST which has since been removed and second which continues to contain a quench oil tank. Both of these tanks are/were regulated under BUSTR. The second UST area as well as a third area also contain several, active heating oil USTs, regulated under Fire Marshal regulations. These operations are important in determining the applicability of VAP rules for use in a prospective closure.

Q10. How will the decision to stop digging out material from Lagoon #1 walls be made?

A10. Assuming that VAP regulatory limits are applied, a geologist trained in this activity will visually observe and identify the point at which the impacted soil has been removed. The same approach will be utilized in removing material for stabilization from the biocell.

PARSONS ENGINEERING SCIENCE, INC.
A UNIT OF PARSONS INFRASTRUCTURE & TECHNOLOGY GROUP INC

19101 Villaview Road, Suite 301 • Cleveland, Ohio 44119 • (216) 486-9005 • Fax (216) 486-6119

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n/admin/wp/Canton

9 July 1997

Mr. Stanley R. Evans
THE BEAVER EXCAVATING COMPANY
4650 Southway Street, S.W.
P.O. Box 6059
Canton, Ohio 44706

Reference: Invitation to Bid on the Lagoon No. 1 Re-Construction Project, Canton Drop Forge, Inc., Canton, Ohio

Dear Mr. Evans:

You are hereby invited to bid on the Lagoon No. 1 Re-construction Project at Canton Drop Forge, Inc. (CDF) in Canton, Ohio. To participate in this bid opportunity, your attendance at a Pre-Bid Meeting, to be held at the CDF plant on Friday, 11 July 1997, is required. The CDF plant is located at 4575 Southway Street, SW in Canton.

The enclosed package includes the Invitation to Bid, Instructions to Bidders, Bid Form, a sample Form of Agreement, a sample Notice of Award, and General and Special Conditions documents as well as a complete set of Drawings and general and detailed Specifications for the referenced Project.

As indicated in our Advance Notice of Request for Proposal, delivered by facsimile to you on 3 July 1997, this Project has a short turn-around anticipated for the contractor selection process. Parsons Engineering Science, Inc. (Parsons ES), on behalf of CDF, intends that a contractor will be selected for this work during the week of 21 July and that a Pre-Construction Meeting will be held on Friday, 25 July 1997. We also anticipate that Construction will start on 4 August 1997 and will be completed by 15 September 1997. If you will not be able to meet this schedule, please advise as soon as possible.

As will be indicated during the Pre-Bid Meeting, to participate in this opportunity, please complete, sign (on pages 3, 4, and 5) or initial (on the remaining pages) and return all seven (7) pages of the Bid Form to me at Parsons Engineering Science, Inc., at the address indicated, by no later than 4:00 PM on Monday, 21 July 1997, for consideration. Bids that are not complete or are received after this time will be rejected.

On behalf of Canton Drop Forge, we look forward to seeing you at the CDF plant at 9:00 AM on Friday, 11 July 1997. If you have any questions regarding the documents enclosed with this Invitation, please contact either Ms. Beth McCartney, the Project Engineer, or me at (216) 486-9005.

Very truly yours,

PARSONS ENGINEERING SCIENCE, INC.

Edward J. Karkalik, PE
Project Manager

EJK/dee
cc: File 73139703000

PARSONS ENGINEERING SCIENCE, INC.
A UNIT OF PARSONS INFRASTRUCTURE & TECHNOLOGY GROUP INC

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9 July 1997

Mr. Raymond Rankin
THE WALSH GROUP - Environmental Construction, Inc.
1405 Newton Street
Tallmadge, Ohio 44278-3499

Reference: Invitation to Bid on the Lagoon No. 1 Re-Construction Project, Canton Drop Forge, Inc., Canton, Ohio

Dear Mr. Rankin:

You are hereby invited to bid on the Lagoon No. 1 Re-construction Project at Canton Drop Forge, Inc. (CDF) in Canton, Ohio. To participate in this bid opportunity, your attendance at a Pre-Bid Meeting, to be held at the CDF plant on Friday, 11 July 1997, is required. The CDF plant is located at 4575 Southway Street, SW in Canton. To reach CDF's property, take I-77 South to US 30 West; follow US 30 to the second exit, marked Raff Road and Whipple Avenue. At the bottom of the exit ramp, turn right and proceed to the first traffic light; turn left at the light onto Southway Street and follow Southway for about 3/4 mile to the CDF plant on your right. At the gate, indicate that you are visiting Jerry Bressanelli, then proceed to the Visitor's Parking and Receptionist.

The enclosed package includes the Invitation to Bid, Instructions to Bidders, Bid Form, a sample Form of Agreement, a sample Notice of Award, and General and Special Conditions documents as well as a complete set of Drawings and general and detailed Specifications for the referenced Project.

As indicated in our Advance Notice of Request for Proposal, delivered by facsimile to you on 3 July 1997, this Project has a short turn-around anticipated for the contractor selection process. Parsons Engineering Science, Inc. (Parsons ES), on behalf of CDF, intends that a contractor will be selected for this work during the week of 21 July and that a Pre-Construction Meeting will be held on Friday, 25 July 1997. We also anticipate that Construction will start on 4 August 1997 and will be completed by 15 September 1997. If you will not be able to meet this schedule, please advise as soon as possible.

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Very truly yours,

PARSONS ENGINEERING SCIENCE, INC.

Edward J. Karkalik, PE
Project Manager

K/dee
: File 73139703000

PARSONS

PARSONS ENGINEERING SCIENCE, INC.
A UNIT OF PARSONS INFRASTRUCTURE & TECHNOLOGY GROUP INC

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9 July 1997

Mr. Jeffrey Salvatore, Project Manager
HASELEY CONSTRUCTION
3690 Hunters Hill
Poland, Ohio 44514

Reference: Invitation to Bid on the Lagoon No. 1 Re-Construction Project, Canton Drop Forge, Inc., Canton, Ohio

Dear Mr. Salvatore:

You are hereby invited to bid on the Lagoon No. 1 Re-construction Project at Canton Drop Forge, Inc. (CDF) in Canton, Ohio. To participate in this bid opportunity, your attendance at a Pre-Bid Meeting, to be held at the CDF plant on Friday, 11 July 1997, is required. The CDF plant is located at 4575 Southway Street, SW in Canton. To reach CDF's property, take I-77 South to US 30 West; follow US 30 to the second exit, marked Raff Road and Whipple Avenue. At the bottom of the exit ramp, turn right and proceed to the first traffic light; turn left at the light onto Southway Street and follow Southway for about 3/4 mile to the CDF plant on your right. At the gate, indicate that you are visiting Jerry Bressanelli, then proceed to the Visitor's Parking and Receptionist.

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As indicated in our Advance Notice of Request for Proposal, delivered by facsimile to you on 3 July 1997, this Project has a short turn-around anticipated for the contractor selection process. Parsons Engineering Science, Inc. (Parsons ES), on behalf of CDF, intends that a contractor will be selected for this work during the week of 21 July and that a Pre-Construction Meeting will be held on Friday, 25 July 1997. We also anticipate that Construction will start on 4 August 1997 and will be completed by 15 September 1997. If you will not be able to meet this schedule, please advise as soon as possible.

As will be indicated during the Pre-Bid Meeting, to participate in this opportunity, please complete, sign (on pages 3, 4, and 5) or initial (on the remaining pages) and return all seven (7) pages of the Bid Form to me at Parsons Engineering Science, Inc., at the address indicated, by no later than 4:00 PM on Monday, 21 July 1997, for consideration. Bids that are not complete or are received after this time will be rejected.

On behalf of Canton Drop Forge, we look forward to seeing you at the CDF plant at 9:00 AM on Friday, 11 July 1997. If you have any questions regarding the documents enclosed with this Invitation, please contact either Ms. Beth McCartney, the Project Engineer, or me at (216) 486-9005.

Very truly yours,

PARSONS ENGINEERING SCIENCE, INC.

Edward J. Karkalik, PE
Project Manager

EJK/dee
cc: File 73139703000

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CANTON DROP FORGE, INC.

LAGOON NO. 1 RE-CONSTRUCTION PROJECT

PRE-BID MEETING

ATTENDEES REGISTRATION

NAME	COMPANY	ADDRESS	TELEPHONE NO,
ED KARKALIK	PARSONS ES	19101 VILLAVIEW ROAD, CLEVELAND, OH 44119	(216) 486-9005
Beth McCartney	"	"	"
JEFF SALVATORE	HASELEY CONSTRUCTION	3690 HUNTER HILL POLAND, OH 44514	330 707 1810 330 707 1811
STAN EVANS	BEAVER EXC	4650 SOUTHWAY ST. S.W. CANTON, OHIO 44706	P-330-478-2151 F-330-478-2122
RAY RANKIN Leslie Walsh	ENVIRONMENTAL CONST. INC	1405 Newton St TALLMADGE, OH	P1-330-633-4435 F1-330-633-9719
Lloyd J Bunnell	CDF	4575 SOUTHWAY	477-4511
JERRY BRESSANELLI	CDF	" "	477-4511 X123

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CANTON DROP FORGE, INC.

LAGOON NO. 1 RE-CONSTRUCTION PROJECT

PRE-BID MEETING

11 JULY 1997

AGENDA

1. INTRODUCTIONS AND SIGN-IN
2. PROJECT DESCRIPTION
3. SCOPE OF WORK & SEQUENCING
4. PROJECT SCHEDULE
   - BIDS DUE - 21 JULY 1997 @ 4:00 PM
   - CONTRACTOR SELECTED / PRE-CONSTRUCTION MEETING - 25 JULY
   - CONSTRUCTION START - 4 AUGUST
   - CONSTRUCTION COMPLETE / START-UP - 15 SEPTEMBER
5. PROJECT DOCUMENTS
   - SPECIFICATIONS AND DRAWINGS
   - CONTRACT
6. ERRATA AND ADDENDA
7. CONSTRUCTION SAFETY
8. CANTON DROP FORGE PROPERTY / PLANT REQUIREMENTS
   - HOURS OF OPERATION
   - SITE SAFETY RULES
   - SECURITY
   - SMOKING POLICY
9. AUTHORIZED PROJECT REPRESENTATIVES
10. PROJECT TOUR
11. QUESTIONS AND ANSWERS

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PARSONS ENGINEERING SCIENCE, INC.

19101 Villaview Road, Suite 301 • Cleveland, Ohio 44119 • (216) 486-9005 • Fax (216) 486-6119

PARESCL/497Dee/EJK7-11

11 April 1997

Copy to Jerry 4/14/97

Mr. Keith Houseknecht
CANTON DROP FORGE, INC.
4575 Southway Street
Canton, Ohio 44706

Dear Mr. Houseknecht:

In accordance with our discussions, including Messrs. Bill Cordier, Jerry Bressanelli, and yourself of Canton Drop Forge, Inc. (CDF) and Messrs. Gordon Melle and Ed Karkalik of Parsons Engineering Science, Inc. (Parsons ES), we submit the following proposal to address the biocell disposal and Lagoon #1 re-construction issues. A separate proposal, addressing condensate handling alternatives, will be forwarded under separate cover in the near future.

Parsons ES understands that CDF is interested in disposing of the materials accumulated in the biocell (located near Lagoon #2) and re-constructing Lagoon #1 for stormwater management in the most cost-effective and time-efficient manner possible. In our discussions, we jointly considered several different alternatives for these two efforts. These briefly included:

1) for biocell material disposal:
    a) transportation to and disposal in an appropriate landfill;
    b) stabilization and deposition in an on-site area to be re-surfaced with asphalt for parking;
    c) stabilization and deposition in a track (i.e., roadway) around the inside perimeter of the property;
    d) stabilization and deposition in a appropriate manner in Lagoon #1 as part of the backfill required to reduce Lagoon #1 capacity to that required for stormwater management;
    e) transportation and sale to Ashland's Canton Refinery for use as feedstock; or
    f) transportation and sale to a local cement kiln or asphalt plant for use as feedstock.
2) for re-construction of Lagoon #1:
    a) use of the biocell material, when encapsulated in clay layers and covered with an appropriate liner, or
    b) transportation of clean fill from an off-site source and installation of an appropriate liner.

In that alternatives (1)(d) and (2)(a) are highly synergistic, substantial added value (and, hence, cost and time savings) are projected for this approach in comparison with any other combination of alternatives. Consequently, attention will be focused on this approach, i.e., using biocell material, which has been appropriately stabilized for structural integrity as well as prevention of contaminant leaching, in the re-construction of Lagoon #1. The foregoing analysis will be confirmed as one of the tasks of our proposal, as outlined below.

It is further understood that CDF requires that the proposed actions, required to address the biocell material disposal and Lagoon #1 re-construction issues, be completed as expeditiously as practicable. Also, since CDF is under no orders or regulatory requirements concerning this work, CDF prefers to complete the proposed actions on a strictly voluntary basis. For this reason, Parsons ES will verify, in conjunction with CDF's legal counsel, that the proposed efforts can be completed under Voluntary Action Program (VAP) guidance. If applicable, this will permit closure of the biocell and Lagoon #1 issues, including the development of an NFA Letter by a Certified Professional, if CDF later chooses to do so, without agency interaction.

PROPOSED SCOPE OF WORK

Described below are the tasks required for achievement of CDF's project objectives. The amount of labor and the costs for labor and other direct costs (ODCs), including analytical laboratory expenses, are indicated for each task in Table 1.

Task 1 - Develop Sampling and Analysis Plan

Parsons will use a square pattern (grid pattern) and lay it over a map of the area in question. Each grid will be 30 feet by 30 feet. A number will be given to each grid intersection.

A random number generator will be used to select 10 sampling locations from the resulting zones of the grid.

Task 2 - Conduct Sampling

Parsons ES will collect 10 samples as defined in the Sampling and Analysis Plan. Each sample will be collected with a precleaned stainless steel trowel and placed in appropriate sample containers. Normal preservation and chain-of-custody procedures apply.

Task 3 - Complete Environmental and Geotechnical Analyses

Samples will be transported to a VAP certified laboratory (e.g., GEOAnalytical Laboratory in Twinsburg, Ohio) for ABN analysis and TPH analysis (DRO, GRO and 418.1). Results will be received 7 to 9 days after submittal.

A volume of soil will be transported to a geotechnical laboratory for testing to determine compressibility and stability. Testing will involve mixing known quantities of Portland cement or pozilime with site material. Testing will include standard proctor and unconfined compressive strength tests.

Task 4 - Review Results of Analyses

Following receipt of results of analyses from the environmental and geotechnical laboratories, Parsons ES will review the results in light of CDF's objectives and in accordance with the VAP requirements. (The applicability of using VAP guidance will be determined concurrently in Task 5 (see below). As a result of these efforts, a conceptual remedial design for treatment (if any, is required) of the biocell materials, will be completed. For example, if an admixture of Portland cement or lime is required to meet VAP compliance limits or for structural

stability, the ratios of biocell material to admixture will be determined. Also, the thickness of any clay layers will be estimated as part of this effort.

Task 5 - Review Freedom of Information Act (FOIA) Information for VAP Applicability

As part of a separate effort, CDF will arrange to collect all available information under the FOIA concerning CDF's compliance status. In particular, it will be useful to determine the specific reason(s) that Ohio EPA has included CDF's property on the Master Sites List (MSL).

Parsons ES will review relevant material collected by CDF to determine the applicability of using the VAP approach for closing the biocell and Lagoon #1. At this time, Parsons ES has no reason to suspect that VAP guidance cannot be used for this project.

The advantage of following VAP guidance are several, including:

1) VAP provides more flexibility and the least restrictive compliance limits of available regulatory approaches.
2) VAP provides a mechanism for obtaining a No Further Action (NFA) Letter, and, hence, closure of the remedial actions.
3) VAP procedures permit completion of all steps leading to and producing an NFA Letter voluntarily; i.e., without agency interaction.

Task 6 - Review Feasibility of Preferred Option

Next, Parsons ES will review the feasibility of completing the proposed actions within budgetary and scheduling constraints. In the background, we will also conduct a cursory screening of the original alternatives to ensure that, against economic, scheduling, technical and regulatory (e.g., VAP) criteria, the preferred option is still the best. Assuming that is true, Parsons ES will work with Beaver Excavating (and any other relevant parties, if required) to develop preliminary cost and schedule estimates to complete the preferred option.

Task 7 - Develop Letter Report

Parsons ES will develop a letter report highlighting the sampling methodology used, the analyses conducted, the results of analyses received, the implication of the analytical results, the conceptual design of the proposed action, applicability of VAP guidance, feasibility review results and preliminary cost and schedule estimates. The report will be issued in draft form for review with CDF prior to finalization (see Task 8 for review). Subsequent to receipt of comments, Parsons ES will revise the report, as appropriate.

Task 8 - Attend Review Meeting

Parsons ES will attend and participate in a meeting with CDF personnel to review the report indicated in Task 7. Although the meeting has been preliminarily scheduled for 22 May 1997, by expediting the previously defined tasks, Parsons ES believes that it can be moved forward by as much as 10 days (i.e., to 12 May 1997) provided that samples can be collected on or before the morning of 18 April 1997 and that the FOIA information is available by 1 May 1997.

PROPOSED BUDGET

Parsons ES proposes to complete the tasks defined above on a "time and expenses, total not-to-exceed" basis. Our estimate for this work, provided that is it completed within the timeframe described above, is $17, 909. Please refer to Table 1 for a detailed breakdown of this estimate.

PROJECT PERSONNEL

Primary project contribution for the described activities will be Messrs. Gordon Melle, Ed Karkalik and Richard Volpi. Copies of their resumes are enclosed.

TERMS AND CONDITIONS

Please refer to the enclosed Engineering Services Agreement (ESA) partially completed for the proposed services. Your endorsement and return (by facsimile is acceptable) of an executed copy of the ESA will serve as Parsons ES' notification to proceed.

Parsons ES is pleased to have this opportunity to be of service to Canton Drop Forge. If you would like additional information regarding this proposal, please contact Ed Karkalik at (216) 486-9005.

Very truly yours,

PARSONS ENGINEERING SCIENCE, INC.

Wilson H. Rownd, P.E.
Vice President/Manager

Edward J. Karkalik, P.E.
Project Manager

WHR/EJK/dee
cc: File 97290097003
Wilson H. Rownd (Parsons ES)
Carol M. Bowers (Parsons ES)

TABLE 1

PROPOSED PROJECT BUDGET

CANTON DROP FORGE, INC.
BIOCELL DISPOSAL / LAGOON #1 RE-CONSTRUCTION

Task # /Description	Labor Hrs	Labor Cost	ODCs Cost	Total Cost
1 - Sampling and Analysis Plan	5	$469	$10	$479
2 - Sampling	10	$729	$100	$829
3 - Sample Analysis	1	$73	$7,650	$7,723
4 - Review Results	14	$1,294	$10	$1,304
5 - VAP Applicability	8	$948	$75	$1,023
6 - Feasibility Review	22	$2,203	$75	$2,278
7 - Letter Report	24	$2,102	$250	$2,352
8 - Review Meeting	16	$1,896	$25	$1,921
TOTAL	**100**	**$9,714**	**$8,195**	**$17,909**

Only copy

Biographical Data

EDWARD J. KARKALIK, P.E.

Environmental Project Manager

EXPERIENCE SUMMARY

Management of and technical guidance for environmental programs including: air quality studies and Title V permitting; soil/groundwater investigation and remediation; pollution prevention design and implementation and technology development and demonstrations for a wide-range of petroleum, related-industry and government facilities. Past experience has also included management of a large bulk product distribution network, international technology management and regulatory review and implementation of agency-required programs, including: spill prevention; air pollution control; wastewater and stormwater collection and treatment; underground and above-ground storage tanks; soil and groundwater remediation; and hazardous waste handling.

EXPERIENCE RECORD

1993-Date Parsons Engineering Science. **Environmental Project Manager**. Responsibilities include development, staffing and implementation of air permitting and control studies, environmental "due diligence" assessments, remedial investigation, design and action projects under CERCLA, RCRA, VAP, and other applicable guidance for large industrial and public agency (e.g., DOE) clients; developing programs and projects to meet clients' needs; and organizing and managing environmental projects, as appropriate.

1991-1993 BP Research, Cleveland, Ohio and Sunbury UK. **Group Leader for Soil/Groundwater Assessment and Remediation**. Directed the technology deployment group providing soil/groundwater assessment and remediation services to BP's operations world-wide; work had been conducted in the U.S., United Kingdom (UK), Holland, Denmark and Australia. Responsible for activities in this functional area ranged from site characterization, assessment and remediation to long-range land-use planning. Scope of activities included all BP businesses groups (Oil Exploration, Refining and Marketing, Chemicals). Also developed partnerships with and provided services under contract to third parties (e.g., American Petroleum Institute, U.S. Department of Energy).

1988-1991 BP International, London. **Manager of Technology Development**. From BP's Head Office, directed the development and implementation of: pollution prevention facilities for storage and handling operations throughout the BP Oil network; environmental expenditure forecast and risk management strategy; R&D strategy and program management; and asset quality management programs. Directed BP's international response to pollution liability claims. Managed group of professional staff and consultants providing technical planning to and advisory support for operations. Developed technical standards and recommended codes of practice for operations worldwide. Coordinated technology transfer throughout BP Oil by means of international networks.

1985-1988 BP Oil (U.S. Operations), Cleveland. **Senior Distribution Manager**. As part of the U.S. downstream distribution operation, managed the petroleum products terminaling and delivery operations in the Great Lakes region. Responsible for 1.5 billion gal/yr throughput and 1 billion gal/yr delivery operation to 5,000 customers in a safe, efficient, and environmentally sound manner, with budgets of $17 MM/yr. Directed the efforts of 190 employees and 100 contract workers, including all aspects of the operation.

1974-1985 The Standard Oil Company (Ohio), Cleveland, Ohio. **Manager of Technical Services** (1982-1985). Directed construction and maintenance program efforts of 40 professionals (including project managers, engineers, and analysts) as well as environmental (air, water, waste, soil/groundwater remediation) compliance, vehicle acquisition, and product loss control programs.

Manager Environmental and Terminal Maintenance (1979-1982). Managed marketing technical and maintenance efforts. Responsible for management of environmental activities, including: environmental affairs programs; construction projects (e.g., vapor recovery, wastewater treatment, remediation); and emergency response.

Environmental Coordinator (1974-1979). Responsible for establishing environmental emergency response network and coordination of transportation projects. Developed and implemented permit acquisition, environmental assessment and impact statement preparation, and engineering feasibility study projects.

EDUCATION

B.S., Civil Engineering and Physics, 1974, Carnegie-Mellon University, Pittsburgh, PA
M.S., Civil (Environmental) Engineering, 1977, Cleveland State University, Cleveland, Ohio
M.B.A., Business Management/Administration, 1983, Baldwin-Wallace College, Berea, Ohio

PROFESSIONAL AFFILIATIONS, HONORS AND AWARDS

Registered Professional Engineer (Ohio 1978, No. 43607)
National Society of Professional Engineers
Regional Environmental Priorities Project (Director Peer Review)
The Chairman's Award for Achievement in Health, Safety and Environmental Care, 1991 (for design of a fail-safe system for storage, transport and distribution of petroleum products)

PUBLICATIONS , PRESENTATIONS AND PAPERS

"Tackling Spills with Teamwork". *R&E View*. No. 6, BP Research, London, September 1993

"Catching the Elusive Vapour". *Financial Times*. London. August 7, 1991 (with Michael Kenward).

"BP Cleans up Chain of Distribution". *Transport Week*. London. June 29, 1991 (with Tim Blakemore, reporting on proceedings of LOGISTICS 91 Conference aboard *The Canberra*, June 1991).

"It's in the Bag!". *Oil: The Journal of BP Oil*. No. 9, BP Oil/Alliance Press. April 1991 (with Mike Kenward).

"Spill Contingency Planning Guidelines for Pipelines", Presented at Water Pollution Control Federation Conference, Houston/Cancun, September 1977.

"Minimizing Potential Losses from Pipeline Operations through Contingency Planning", Presented to International School of Hydrocarbon Measurement, University of Oklahoma, May 1977.

Biographical Data

ROBERT E. HINCHEE only copy

Senior Technical Manager

EXPERIENCE SUMMARY

Dr. Hinchee has extensive experience developing and applying technology to assess and remediate contaminated sites. He developed and applied new technologies Ī including soil gas surveying, soil venting, in situ bioremediation, and TCE cometabolic bioremediation Ī at more than 400 sites throughout Europe and the United States. He designed and evaluated groundwater pump-and-treat and soil treatment systems. In addition, he was responsible for the design and implementation of field demonstration in situ processes such as forced-air soil venting, enhanced bioreclamation, and in-place stabilization systems. He organized and chaired the International Symposia on In Situ and On-Site Bioreclamation, held in San Diego (1991, 1993, and 1995). In addition to technical work, Dr. Hinchee has testified to the U.S. Congress and served as an expert witness in a variety of cases.

EXPERIENCE RECORD

1995-Date Parsons Engineering Science. **Senior Technical Manager.**

1988-1995 Battelle Columbus, Ohio. **Senior Research Leader.**

Bioventing. Project manager of studies at Hill Air Force Base (AFB), Utah, Eielson AFB, Alaska, Preschen AFB, Germany, and Neuruppin Panzer Base, Germany, in which bioventing projects are being monitored for biodegradation resulting from the introduction of oxygenated air into the vadose zone. The projects have included the design and implementation of in situ respiration tests, estimation of JP-4 jet fuel biodegradation rates, and calculation of the relative contributions of biodegradation and volatilization to the effectiveness of a soil venting project. The results of these activities have led to improvements in the technology, with subsequent applications at more than 200 sites in Europe and the United States.

Forced Air Soil Venting. Designed innovative soil venting systems for in situ removal of volatile organics from the vadose zone and supervised installation and evaluation of these systems at numerous sites throughout Europe and the United States. Responsibilities included obtaining offgas discharge permits for sites in California and Delaware and design of offgas treatment systems. Consulting specialist for technology transfer projects in Genoa, Italy, and Hofn, Iceland.

Trecate Blowout Remediation. Served as technical expert responsible for conceptualization and design of the bioremediation effort at the Trecate Blowout Site in northern Italy. The effort includes 25,000 m3 of bioheap pile treatment and 400 ha of landfarming.

TCE Cometabolism. As program manager under contract to the U.S. Air Force, oversaw the development of a pilot-scale (200 L) reactor for cometabolic treatment of TCE-contaminated groundwater. This represented the first pilot-scale application of the process.

1983-1988 EA Engineering Science and Technology. San Francisco, California. **Manager Western, Regional Engineering.** *Enhanced Bioreclamation*. Project manager and engineer in charge of a large full-scale demonstration program for the U.S. Air Force. A site of approximately 1½ acres contaminated with approximately 25,000 gallons of JP-4 jet fuel was selected by the Air Force for demonstration purposes. The initial phases of the project involved bench-scale laboratory testing to (1) determine nutrient and oxygen requirements for optimal design, and (2) complete recovery of floating product (JP-4 still in free-phase form on the water table). A nutrient delivery system using hydrogen peroxide as an oxygen source was subsequently designed and constructed. The system is capable of pumping 30 to 50 gpm of groundwater.

Pretreatment consists of air stripping and iron removal plus the addition of nutrients and hydrogen peroxide. Field trials were initiated in January 1987, and the system began full-scale operation in March 1987.

Fuel Contamination Remediation/Investigation. Evaluated causes of leakage and extent of contamination at more than 100 fuel-contaminated sites, and developed and implemented remedial designs. Assessments have included evaluation of tank failure, hydrogeological and chemical data evaluations, and multi-phase transport modeling. Contamination evaluations have included numerous multi-source evaluations. Designs of remedial actions have included active (1- and 2-pump systems) and passive product recovery; activated carbon air stripping and overland flow for water treatment; and soil excavation and induced soil venting for recovery of residuals. Implementations have included active/passive product recovery, activated carbon, air stripping, overland flow, and induced soil venting.

Soil Gas Surveys. Developed an innovative approach to contaminated site assessment using a soil gas technique, then applied the technology at more than 100 soil gas surveys across the United States. Assisted in the development of an active soil gas sampling technique and the setup of a portable gas chromatographic system for on-site soil gas constituent analysis.

Refinery Wastewater Treatment. Directed engineering aspects of a toxics reduction evaluation study at an oil refinery in Northern California. Following California's implementation of toxicity-based effluent discharge requirements, the refinery's wastewater treatment facilities were found to be inadequate to sufficiently reduce toxicity resulting from a complex mixture of recalcitrant toxic organic compounds. The studies included development of a pilot-scale treatment plant consisting of a foul water stripper, two scaled-down aeration lagoons, four-celled rotating biological disk units, and a powdered-activated carbon unit. Various system modifications to the pilot-scale unit were evaluated, and recommendations were made for scaled-up modifications.

Environmental Audits. Evaluated potential environmental liabilities of several major industries. As part of the due diligence investigation prior to acquisition, served as project manager for an environmental audit of a holding company consisting of 104 operating industries. These included pesticide and other chemical manufacturing operations, electronics manufacturing, lead-acid battery manufacturing, secondary lead smelting, and 35 Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites.

Industrial Sludge Stabilization. Conducted treatability studies on a lightweight aggregate facility's scrubber sludges to evaluate the effectiveness of chemical addition to reduce leachability of metals from the sludge and generate a pozzolanic reaction. Specifically, stabilization of cadmium, lead, barium, and selenium was investigated. Pozzolanic reactions leading to monolithic products subject to the EPA's EP toxicity structural integrity testing also were investigated.

1980-1983 Utah Water Research Laboratory. Logan, Utah. **Research Assistant.** *Water Treatment Engineering.* Designed and conducted pilot-scale packed column aeration studies for the removal of fuel hydrocarbons. The fuel contained the additive isopropyl ether (IPE), which has a relatively high solubility, low vapor pressure, and low Henry's law constant. Extensive field-scale pilot testing and higher-than-typical air-to-water ratios were required to achieve the desired level of treatment. Based on the pilot-scale studies, a full-scale aeration column was designed. A full description of the theory and practice of packed column aeration for volatile organic compound (VOC) removal was developed and presented to the State of Maryland. This resulted in the state's first approval for an air stripping unit to treat potable water.

Environmental Engineering. Conducted bench-scale studies for water/wastewater treatment unit process design. Processes evaluated included activated sludge, ion exchange, activated carbon,

electroanalysis, reverse osmosis, and coagulation/flocculation. Designed and conducted a project to evaluate the use of calcium phosphate sludge for treatment of high-fluoride waters. Developed a computer model to simulate the effects of diurnal flow variations on biological oxygen demand (BOD) removal by the contact stabilization process.

Groundwater Quality Modeling. Conducted research on groundwater contaminant transport mechanisms. Mechanisms evaluated included advective, diffusive, and dispersive transport, retardation due to adsorption, and retardation due to mass transfer considerations. Based on this evaluation, a computer simulation model was developed to predict transport of organic carcinogens in a field groundwater situation.

Environmental Chemistry. Conducted research in central Utah to determine the effect of increased coal mining on water quality. Measured water quality parameters, particularly heavy metal concentrations, in accrual water from existing coal mines and in laboratory leaching columns of coal. Assessed the potential for impact on surface water quality. Evaluated the distribution of heavy metals in sediments surrounding an oil refinery in Louisiana.

EDUCATION

B.S.in Zoology/Chemistry, 1974, Utah State University

M.S. in Oceanography, 1977, Louisiana State University

Ph.D.in Civil and Environmental Engineering, 1983, Utah State University

PROFESSIONAL ACTIVITIES AND AFFILIATIONS

1995. Bioremediation Action Committee, USEPA Executive Committee Member

1995. U.S. Air Force Expert Panel on DNAPL Remediation, Wakalla Springs, Florida

1995. In Situ Chemical Oxidation Processes Expert Working Group, Cincinnati, Ohio

1994-1995. Air Sparging Expert Working Group, organized by American Petroleum Institute and Oregon Graduate Institute, Portland, Oregon

1994 Keynote speaker, Conference on Environmental Geotechnical Engineering, Edmonton, Alberta

1994 Keynote speaker, BASREP Symposium, Calgary, Alberta

1994. U.S. Army Corps of Engineers Expert Panel on DNAPL Site Remediation, San Antonio, Texas

1993- present. Associate Editor of the Journal of Environmental Engineering, ASCE

1981-present. American Society of Civil Engineers

1983- present. National Water Well Association

1995. In Situ and On-Site Bioreclamation: An International Symposium. Organizer and conference chair. San Diego, California.

1993. In Situ and On-Site Bioreclamation: An International Symposium. Organizer and conference chair. San Diego, California.

1991. USEPA Conference on Soil Vacuum Extraction, invited session chair for Bioventing. Houston, Texas.

1991. In Situ and On-Site Bioreclamation: An International Symposium. Organizer and conference chair. San Diego, California.

1989. SETAC chair for session on Biological Treatment of Contaminated Soils and Groundwater. Toronto, Canada.

1989. 2nd International Symposium on Solid-Liquids Separations, chair for session on In-Situ Treatment Technologies. Columbus, Ohio.

1987. SETAC chair for session on Enhanced Bioreclamation. Pensacola, Florida.

PROFESSIONAL REGISTRATION

Registered Professional Engineer (California, 1985, No. C039606 and Florida, 1987, No. 39350)

PUBLICATIONS AND PRESENTATIONS (in past 10 years)

Hinchee, R.E. "In Situ Bioremediation," 1995, Athens Engineering Society, Athens, Greece.

Alleman, B. C., R. E. Hinchee, R. C. Brenner, and P. T. McCauley. 1995. "Bioventing PAH Contamination at the Reilly Tar Site." *In Situ Aeration: Air Sparging, Bioventing, and Related Remediation Processes*. Battelle Press, Columbus, OH. pp. 473-482.

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Hinchee, R. E., G. D. Sayles, and R. S. Skeen (Eds.). 1995. *Biological Unit Processes for Hazardous Waste Treatment*. Battelle Press, Columbus, OH. 370 pp.

Hinchee, R. E., A. Leeson, and L. Semprini (Eds.). 1995. *Bioremediation of Chlorinated Solvents*. Battelle Press, Columbus, OH. 350 pp.

Hinchee, R. E., J. L. Means, and D. R. Burris (Eds.). 1995. *Bioremediation of Inorganics*. Battelle Press, Columbus, OH. 184 pp.

Hinchee, R. E., R. E. Hoeppel, and D. B. Anderson (Eds.). 1995. *Bioremediation of Recalcitrant Organics*. Battelle Press, Columbus, OH. 380 pp.

Hinchee, R. E., R. N. Miller, and P. C. Johnson (Eds.). 1995. *In Situ Aeration: Air Sparging, Bioventing, and Related Remediation Processes*. Battelle Press, Columbus, OH. 634 pp.

Hinchee, R. E., J. T. Wilson, and D. C. Downey (Eds.). 1995. *Intrinsic Bioremediation*. Battelle Press, Columbus, OH. 278 pp.

Hinchee, R. E., C. M. Vogel, and F. J. Brockman (Eds.). 1995. *Microbial Processes for Bioremediation*. Battelle Press, Columbus, OH. 374 pp.

Hinchee, R. E., G. S. Douglas, and S. K. Ong (Eds.). 1995. *Monitoring and Verification of Bioremediation*. Battelle Press, Columbus, OH. 286 pp.

Hoeppel, R. E., J. A. Kittel, F. E. Goetz, R. E. Hinchee, and J. E. Abbott. 1995. "Bioslurping Technology Applications at Naval Middle Distillate Fuel Remediation Sites, *Applied Bioremediation of Petroleum Hydrocarbons*. Battelle Press, Columbus, OH. pp. 389-400.

Leeson, A., R. E. Hinchee, G. L. Headington, and C. M. Vogel. 1995. "Air Channel Distribution During Air Sparging: A Field Experiment." , *In Situ Aeration: Air Sparging, Bioventing, and Related Remediation Processes*. Battelle Press, Columbus, OH. pp. 215-222.

Leeson, A., J. A. Kittel, R. E. Hinchee, R. N. Miller, P. E. Haas, and R. Hoeppel. 1995. "Test Plan and Technical Protocol for Bioslurping." *Applied Bioremediation of Petroleum Hydrocarbons*. Battelle Press, Columbus, OH. pp. 335 347.

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Zwick, T. C., A. Leeson, R. E. Hinchee, R. E. Hoeppel, and L. Bowling. 1995. "Soil Moisture Effects During Bioventing in Fuel-Contaminated Arid Soils" *In Situ Aeration: Air Sparging, Bioventing, and Related Remediation Processes*. Battelle Press, Columbus, OH. pp. 333-340.

Hinchee, R. E. (Ed.). 1994. *Air Sparging for Site Remediation*. Lewis Publishers, Ann Arbor, MI. 152 pp.

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Kellems, B. L., and R. E. Hinchee. 1994. "Review of Bioremediation Experience in Alaska." *Hydrocarbon Bioremediation*. Lewis Publishers, Ann Arbor, MI. pp. 438-443.

Means, J. L., and R. E. Hinchee (Eds.). 1994. *Emerging Technology for Bioremediation of Metals*. Lewis Publishers, Ann Arbor, MI. 158 pp.

Norris, R. D., R. E. Hinchee, and others. 1994. *Handbook of Bioremediation*. Lewis Publishers, Ann Arbor, MI. 257 pp.

Ong, S. K., A. Leeson, R. E. Hinchee, J. Kittel, C. M. Vogel, G. D. Sayles, and R. N. Miller. 1994. "Cold Climate Applications of Bioventing." *Hydrocarbon Bioremediation*. Lewis Publishers, Ann Arbor, MI. pp. 444-453.

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Hinchee, R. E. 1994. "In Situ Bioremediation of Petroleum Hydrocarbons: State of the Art" Conference on Environmental Geotechnical Engineering, Edmonton, Alberta, Canada.

Hinchee, R. E. 1994. "Air Sparging." Fuel Bioremediation Workshop, Naval Facilities Engineering Center, Port Hueneme, CA.

Hinchee, R. E. 1994. "Basic Principles of Bioventing." Fuel Bioremediation Workshop, Naval Facilities Engineering Center, Port Hueneme, CA.

Hinchee, R. E. 1994. "Biological Aspects of Air Sparging." Workshop on Air Sparging sponsored by Oregon Graduate Institute, BP, Chevron, and Shell Oil; Portland, OR.

Hinchee, R. E. 1994. "Bioventing for Remediation of UST Sites." One-day short course at the Air and Waste Management Society UST Conference, St. Louis, MO.

Hoeppel, R. E., and R. E. Hinchee. 1993. "Enhanced Biodegradation for On-Site Remediation of Contaminated Soils and Groundwater." In D. J. Wilson and A. Clark (Eds.), *Hazardous Waste Site Soil Remediation: Theory and Application of Innovative Technologies*. Marcel Dekker Inc., New York, NY. pp. 311 431.

Johnson, R. L., P. C. Johnson, D. B. McWhorter, R. E. Hinchee, and I. Goodman. 1993. "An Overview of Air Sparging." *Journal of Ground Water Monitoring and Remediation*, 13(3):127-135.

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Hinchee, R. E. 1993. "Polyaromatic Hydrocarbon Remediation." Rutgers Carbochemica Remediation Workshop, Parma, Italy.

Hinchee, R. E. 1993. "Bioventing." ARCO Soils Workshop, Anchorage, AK.

Hinchee, R. E. 1993. "Progress Report of the Joint Air Force/EPA In Situ Bioremediation Program." Symposium on Cold Regions Bioremediation, Fairbanks, AK.

Hinchee, R. E. 1993. "Bioventing ĭA Short Course." International Network for Environmental Training. Multiple presentations in San Diego, CA; Seattle, WA; St. Louis, MO; Washington, DC; Hilton Head, SC; Anaheim, CA; Houston, TX; and Tampa, FL.

Hinchee, R. E. 1993. "Bioventing for In Situ Remediation." U.S. Air Force Center for Environmental Excellence Conference on Technology Transfer, San Antonio, TX.

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Hinchee, R. E., S. K. Ong, R. N. Miller, D. C. Downey, and R. Frandt. 1992. *Test Plan and Protocol for a Field Treatability Test for Bioventing*. U.S. Air Force Center for Environmental Excellence, Brooks AFB, TX. 80 pp.

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Hinchee, R. E. 1992. "Bioventing." AWMA Teleconference, downlinked throughout the United States and Canada.

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Aggarwal, P. K., and R. E. Hinchee. 1991. "Monitoring In-Situ Biodegradation of Hydrocarbons Using Stable Carbon Isotopes." *Environmental Science and Technology*, 25(6):1178-80.

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Ong, S. K., R. E. Hinchee, R. Hoeppel, and R. Scholze. 1991. "In-Situ Respirometry for Determining Aerobic Degradation Rates." *In Situ Bioreclamation*. Butterworth-Heinemann, Stoneham, MA. pp. 541-45.

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Hinchee, R. E. 1991. "Bioremediation Coupled with Soil Vacuum Extraction." USEPA Conference on Soil Vacuum Extraction, Houston, TX.

Hinchee, R. E. 1991. "Bioventing for JP-4 Remediation." U.S. Air Force Technology Transfer Conference, San Antonio, TX.

Hinchee, R. E. 1991. "Emerging Technologies for Remediation of Underground Storage Tank Leaks." Marathon Oil Conference on Technology Development, Denver, CO.

Hinchee, R. E. 1991. "*In Situ* Bioremediation." USEPA/RREL Seminar Series, Cincinnati, OH.

Hinchee, R. E. 1991. "*In Situ* Bioremediation of Oil-contaminated Soils." ARCO Corporate Seminar Series, Anchorage, AK.

Hinchee, R. E., and R. N. Miller. 1991. "Bioventing for Application to U.S. Air Force Sites." U.S. Air Force Center for Environmental Excellence Conference on IRP Site Remediation Technologies, San Antonio, TX.

Hinchee, R. E., D. C. Downey, and R. N. Miller. 1990. "Enhancing Biodegradation of Vadose Zone JP-4 through Soil Venting." Proceedings of the HMCRI: 7th National RCRA/Superfund Conference. pp. 387-389.

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Miller, R. N., R. E. Hinchee, C. M. Vogel, R. R. Dupont, and D. C. Downey. 1990. "A Field Scale Investigation of Enhanced Petroleum Hydrocarbon Biodegradation in the Vadose Zone at Tyndall AFB, Florida." Proceedings of API/NWWA Conference: Petroleum Hydrocarbons in the Subsurfaced Environment.

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Hinchee, R. E. 1990. "In-Situ Bioremediation of Hydrocarbon Spills." Northern Ohio Geological Society, University of Akron, OH.

Hinchee, R. E. 1990. "In-Situ Remediation of Soil and Ground Water: U.S. Experiences." Water Resources Research Centre, Budapest, Hungary.

Hinchee, R. E. 1990. "Remediation Technology Alternatives Overview." Olin Corporation's Environmental Remediation Technology Conference, Cheshire, CT.

Hinchee, R. E. 1990. "Soil Venting." Chevron Corporation, Environmental Engineering Conference, Denver, CO.

Hinchee, R. E., and R. N. Miller. 1990. "Bioreclamation of Hydrocarbons in the Unsaturated Zone." Envirotech Vienna, Vienna, Austria.

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Hinchee, R. E. 1987. "Subsurface Transport of Fuel Residuals, Considerations for Remedial Design." Presented at Stanford University Environmental Engineering Seminar Series, Palo Alto, CA.

Hinchee, R. E., H. J. Reisinger, D. Barris, B. J. Marks, and J. S. Stepek. 1986. "Underground Fuel Contamination, Investigation and Remediation: A Risk Assessment Approach to How Clean Is Clean." Proceedings of API/NWWA Conference: Petroleum Hydrocarbons in the Subsurface Environment. Columbus, OH. pp. 539-563.

Hardy, T. B., V. D. Adams, B. A. Naeger, M. E. Pitts, and R. E. Hinchee. 1985. "A Survey of Graduate Education in Environmental Engineering." Proceedings of the ASCE Conference Challenges to Engineering Educators and Practitioners. Columbus, OH.

Hinchee, R. E., and H. J. Reisinger. 1985. "Multi-Phase Transport of Petroleum Hydrocarbons in the Subsurface Environment: Theory and Practical Application." Proceedings of API/NWWA Conference: Petroleum Hydrocarbons in the Subsurface Environment. Columbus, OH. pp.188-201.

Hinchee, R. E. 1986. "Leaking Underground Storage, Scope of the Problem." Presented at Maryland Environmental Laws: A Seminar for Underground Tank Owners and Generators of Hazardous Wastes, Baltimore, MD.

Hinchee, R. E. 1986. "Remedial Action for Contaminated Soil and Ground Water." Presented at Maryland Environmental Laws: A Seminar for Underground Tank Owners and Generators of Hazardous Wastes, Baltimore, MD.

Hinchee, R. E. 1985. "Leaking Underground Storage Tanks, Causes and Solutions." Presented to the Towson Section of the Engineering Society of Baltimore, Towson, MD.

Hinchee, R. E., and H. J. Reisinger. 1985. "Leaking Underground Storage Tanks, Magnitude of the Problem and Regulatory Implications." Proceedings of the Regional Section of the WPCA, Ocean City, MD.

Biographical Data Only copy

GORDON J. MELLE

Civil Engineer

EXPERIENCE SUMMARY

Broad experience in design and construction of civil and industrial projects. Responsible for preparation of plans and specifications and construction management for a variety of wastewater treatment and industrial projects throughout the United States.

EXPERIENCE RECORD

1972-Date Parsons Engineering Science, Inc. **Civil Engineer**. Responsible for design of environmental engineering facilities and preparation of specifications for structural work involving underground concrete structures, spread footings and caisson foundations, sheet pile cofferdam for 35-foot deep excavation, reinforced masonry buildings for seismic loading, concrete-lined lagoons, structural steel platforms, sewers, and site improvements. Directed field surveys, developed structural design criteria, and prepared contract bid plans and specifications for combined sewer rehabilitation projects.

Project Manager/Resident Engineer. Responsible for contract administration, review of shop drawings and test results, field inspection, evaluation of requests for payment, and preparation of record drawings for construction of a 50 mgd advanced wastewater treatment facility, 300 mgd stormwater treatment facility, and a 45 mgd biological treatment facility. Provided direct assistance to the Owner in evaluating construction procedures, preparing engineering solutions for construction changes, preparing cost estimates for field changes, and evaluating critical path scheduling. Managed design of plating wastewater treatment facility for aircraft components manufacturer and construction chemical producer. Performed value engineering studies of municipal wastewater treatment facility designs. Structural design of industrial plant modifications for automotive components manufacturer. Managed design of improvements at five bulk petroleum terminals including oil/water separators, oil storage tanks, storm sewers, dikes, and pump stations. Prepared construction QA/QC plan for hazardous waste land disposal facility closure. Designed sludge processing facility for hazardous waste treatment plant. Managed design of groundwater treatment system for bulk petroleum terminal. Managed third party QA/QC program for hazardous waste site remediation. Managed design of two new jet fuel facilities for corporate hangars. Designed improvements to seven airport jet fuel facilities. Conducted construction cost study comparing new buildings versus renovating existing buildings for chemical manufacturer. Managed design of new airport office building. Designed stormwater treatment system for refuse hauling facility Designed secondary containments for hazardous waste treatment systems. Managed QA/QC program for construction of solid waste disposal facility at a steel mill. Designed groundwater treatment system for automobile parts manufacturing facility. Managed study of storm water system at Newark AFB and developed storm water pollution prevention plan. Prepared storm water pollution prevention plans for two industrial facilities. Managed industrial wastewater flow survey at world's largest automatic washing machine manufacturing facility. Designed replacement fuel dump and floor drainage systems for jet engine fuel pump test facilities. Designed RCRA cap and slurry wall to close chemical waste disposal cells. Managed design of packaged dry cement-based products manufacturing facility.

Biographical Data

RICHARD W. VOLPI

Hydrogeologist

EXPERIENCE SUMMARY

Experience in management and technical design/analysis on projects involving groundwater hydrogeology and solid and hazardous waste. Familiar with State and Federal requirements for permitting and regulating of waste handling facilities, and with RCRA/CERCLA regulations. Familiar with State and Federal regulations pertaining to requirements for owners and operators of Underground Storage Tanks (USTs) and underground pipelines.

EXPERIENCE RECORD

1988-Date Parsons Engineering Science. **Project Manager**. Involved in management and implementation of projects involving site investigation, remedial design and construction management at industrial, and hazardous waste facilities.

Representative projects include:

Remedial Investigation, Feasibility Study and Remedial Design (RI/FS/RD) at a large Ohio Manufacturing facility. Environmental concerns include soil and groundwater impacts involving VOCs, metals and PCBs.

Groundwater Quality Assessment and Abatement program for several Underground Storage Tank (UST) sites in Ohio. Focus is to identify and address VOC contamination.

Hydrogeologist. Responsible for development, implementation and review of groundwater monitoring programs for RCRA/CERCLA operations and facilities with USTs. Conduct site supervision, sampling, drilling, monitoring well installation and quality control related to closures of hazardous and non-hazardous waste facilities. Responsible for interpretation of data collected and development of Remedial Investigations and Feasibility Study Reports (RI/FS) for RCRA/CERCLA facilities.

Designed and directed the technical aspects of exploration and remediation design of aquifers contaminated with VOCs at various hazardous and non-hazardous facilities in Ohio. Major factors included identification of areal extent and remediation through location, testing, design of exploration or monitoring wells, production wells, vapor extraction wells, infiltration galleries and/or trenches.

Familiar with the use of flow/transport mathematical models MODFLOW, MOC, Dream, THwells and Bioplume™ II, and how they relate to actual site conditions. Employed the mathematical models to numerous projects, including the first approved BUSTR risk assessment.

Familiar with the use of unsaturated leaching model VLEACH and how it relates to actual site conditions. Used VLEACH extensively to determine if soil remaining at various sites posed an environmental impact threat to groundwater. Developed cleanup criteria based on VLEACH results.

Key member in the development of the first full-scale Air Sparging Decision Tool. Input included developing and integrating hydrogeologic information, contaminant, biodegradation, volatilization, and air migration equations into one concise usable model.

Conducted Phase I Site Assessments following ASTM Procedures at numerous locations in Ohio, PA and Maryland. Completed Phase II Site Assessments based on information gathered in Phase I Assessments.

Completed 40 hour Hazardous Waste Operations Course in accordance with 29 CFR Part 1910.120. Work experience in Level "B" safety conditions.

1987-1988 Ohio EPA, Southeast District Office. **Geologist/Hydrogeologist**. Analyzed geology and hydrogeology of waste management facilities. Reviewed site investigation reports, permit-to-install (PIT) applications, and engineering plans. Conducted field drilling and sampling. Performed Comprehensive Ground-Water Monitoring Evaluations for RCRA facilities.

1986-1987 University of Akron, Geology Department. **Graduate Teaching and Research Assistant.** Taught and organized Physical Geology laboratories. Analyzed soil mineralogy via x-ray diffraction and petrography.

EDUCATION

B.S., Geology, 1984, University of Akron
M.S., Geology, 1987, University of Akron

PROFESSIONAL AFFILIATIONS

State of Kentucky, Certified Professional Geologist (#1120)
State of Pennsylvania, Certified Professional Geologist (#0088)
Association of Ground-Water Scientists and Engineers

PAPERS AND PRESENTATIONS

"The Effects of Pennsylvanian Shales on Glacial Tills of Columbiana County, Ohio", M.S. Thesis, University of Akron, May 1987.

PARSONS ENGINEERING SCIENCE COMPANIES

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ENGINEERING SERVICES AGREEMENT

PARSONS ES: Parsons Engineering Science, Inc.
19101 Villaview Road, Suite 301
Cleveland, Ohio 44119

AGREEMENT NO. _____

CLIENT'S ID. NO. _____

CLIENT: Canton Drop Forge, Inc.
4575 Southway Street, Canton, Ohio 44706

EFFECTIVE DATE	COMPLETION DATE	PARSONS ES' CONTACT	CLIENT'S CONTACT
4/14/97	12/31/97	Edward Karkalik ( )216-486-9005	Keith Houseknecht ( ) 330-477-4511

COMPENSATION

- ☐ STANDARD RATE SCHEDULE (Attachment A)
- ☒ PAYMENT SHALL NOT EXCEED $ ~~17,909~~ UNLESS AUTHORIZED IN WRITING BY CLIENT
- ☒ OTHER (as indicated below)
- ☐ LUMP SUM $_____
- ☒ INVOICE MONTHLY (INSTRUCTIONS BELOW)

ITEM	DESCRIPTION OF SERVICES/SPECIAL PROVISION
01	Provide services as described in Parsons ES' proposal dated 4/11/97. Labor will be billed at direct labor rates times a multiplier of 2.95 and ODCs will be billed at cost plus 10%.

PARSONS ES

Date

W. H. Rownd, PE

Vice President/Manager

CLIENT

Date

THE STANDARD TERMS AND CONDITIONS CONTAINED ON THE REVERSE SIDE HEREOF ARE APPLICABLE TO THIS AGREEMENT

PARSONS

REV 10/96

PARSONS ES ACCOUNTING

CDF001596

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98077

American Landfill, Inc.

An American Waste Services Company

One American Way • Warren, OH 44484-5555 • Phone: (330) 856-8800 • Fax: (330) 856-8483

May 15, 1997

Via Facsimile #216-486-6119

Mr. Rick Volpi
Parsons Engineering Science
19101 Villaview Road, Suite 301
Cleveland, Ohio 44119

RE: Transportation and Disposal of TPH Contaminated Soil
American Waste Services I.D. #21707-1

Dear Mr. Volpi:

American Landfill, Inc. is pleased to quote pricing for transportation and disposal of TPH Contaminated Soils (non-hazardous) from your project in Canton, OH (Stark County). Pricing is as follows:

Transportation & Disposal: $20.50 per ton, which includes current Ohio disposal fees.
Transportation provided by Envirco Transportation Management, Inc. (#29859)

1) Material deemed to contain liquids may incur additional charges.
2) Liner is included.
3) 22 ton minimum per truck.
4) Demurrage Fee: Two hours free at each end and $60.00 per hour thereafter
5) Failure to load scheduled trucks may result in "no load" charges.
6) Five rounds per truck per day.

The above pricing is based on the information supplied and also subject to approval of this waste at American Landfill, Inc. These prices are valid for thirty (30) days from date of this letter.

Invoicing and taxes will be based upon weight tickets generated by certified scales. Payment for services performed shall be made within fifteen (15) days of receipt of invoice.

Parsons Engineering Service will be responsible for all applicable sales taxes, waste disposal taxes, and transportation taxes other than those included above. Any increase in taxes will be passed on to Parsons Engineering Service.

If you have any questions, please do not hesitate to contact me at (330) 856-8800. I look forward to servicing your disposal needs.

Sincerely,

Robert Lehman

Robert A. Lehman
Territory Sales Manager

RAL:jh:ALL.21707

CDF001597

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AMERICAN WASTE SERVICES, INC.
One American Way • Warren, Ohio 44484-5555
PHONE (330) 856-8800
FAX (330) 856-8480

Date: May 15, 1997

To: Rick Volpi

Company: Parsons Engineering Science

FAX No.: (216) 486-6119

From: Bob Lehman

Company: American Waste Services, Inc.

Message: Transportation & Disposal of TPH Contaminated Soil
Project will follow.

Total number of pages: 2 (including this cover page).